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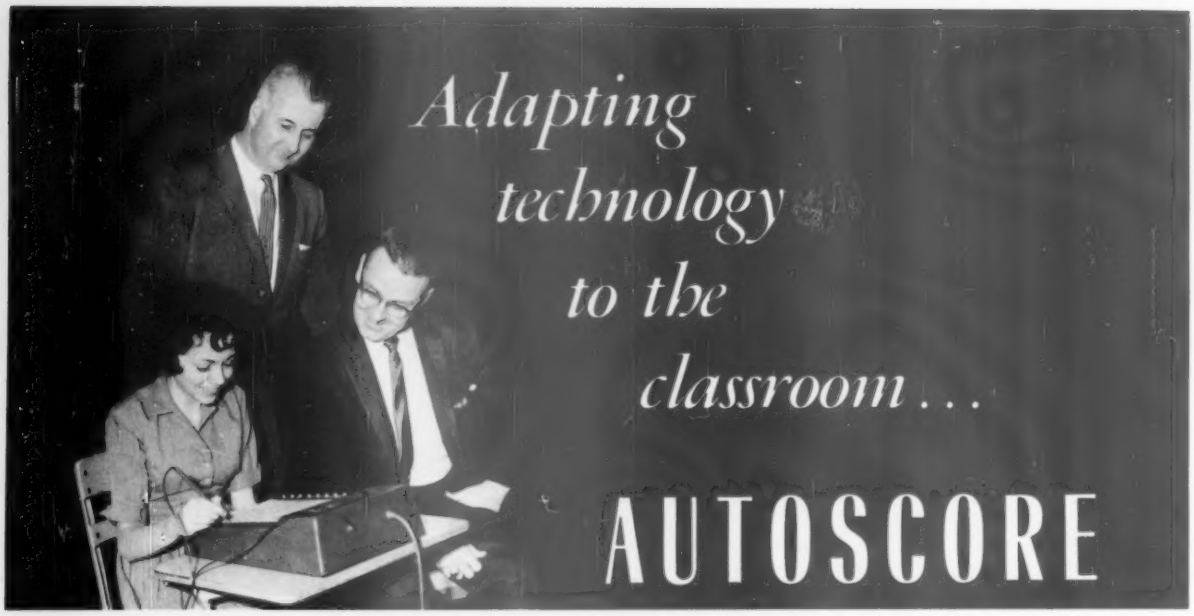

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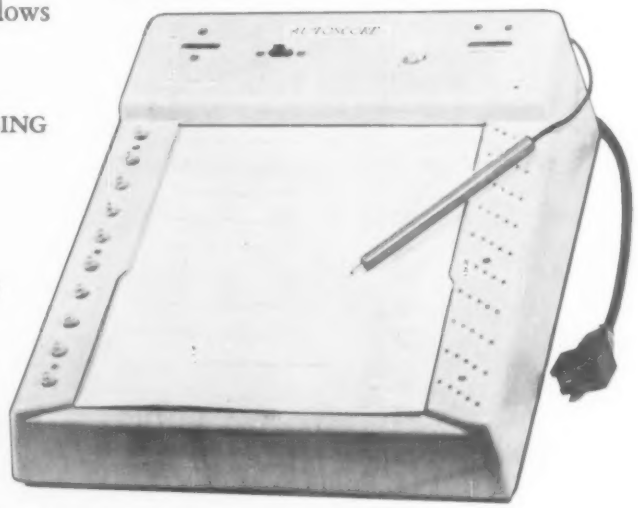

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In addition to the films listed, series on Nuclear Radiation, Heat and Cold, and Plane Geometry will be available shortly.

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Convention-Bound North Carolinians may travel en masse. The North Carolina AV association with Herman Preseren of New Bern at the helm is pushing the project of chartering a bus to Miami and return. According to last reports it looked as though Mr. Preseren would get the 30 signers needed. If so, North Carolina will have a sizeable aggregation at Miami.

Summer Meeting: Emma Fantone, co-director, audio-visual center, New Jersey State Teachers College at Upper Montclair, has been named chairman of the planning committee. Date: June 26 during the NEA Convention at Atlantic City. See May issue for details on day-long program.

TV Primer Just Out: This is the joint publication of DAVI and the Department of Classroom Teachers designed to help the classroom teacher understand and utilize educational television. Eight TV experts and classroom teachers have contributed to its 80 pages. Entitled And TV, Too! it is available from Publication Sales, NEA, for $1.25.

The Second Classroom is a half-hour film which demonstrates established ways in which television can contribute to education. It contains excerpts from seven programs from Boston to Seattle and Minneapolis to Houston. 16mm, B/W, available soon from DAVI for $75. Rental, $5 for three days.

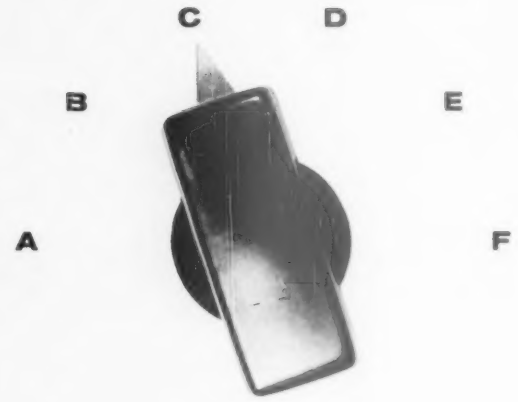
Elementary Principals Study Reality: Keynote feature at the Elementary Principal's Convention in Atlantic City was a sound filmstrip based on Contemporary Issues in Elementary Education, the recent release of the Educational Policies Commission. DAVI cooperated on production of the strip which presents the realities of society and realities of learning that serve as guidelines for decision making in elementary education. Entitled Guidelines for Decisions on Issues in Elementary Education, it is available (with 33 1/3 rpm record, script, and instruction booklet) for $8 from the Department of Elementary School Principals, NEA.

Note on the Theme: Skinner at work in his laboratory at Harvard has been captured on film as announced from Carousel Films, Inc., 1501 Broadway, New York 36. 16mm sound, B/W, 26 minutes, $135. Title: Learning & Behavior (The Teaching Machine). . . New publication just reaching national office: Automation in Education: Machines and Men as Teachers and Learners. A 27-page publication with three authors, Galanter, Rothkopf, and Siegel. Reprinted from Teachers College Record, December 1960. 50 cents, Teachers College, Columbia University.

Photo Credits: page 126, courtesy Dyna Slide Company and Hughes Aircraft; page 128, Ohio State University; page 129, photo by Gil Corlett; page 130, Duette Photographers, Boston; page 134, courtesy of the author; page 160, Carl Purcell; page 165, Indiana University Audiovisual Center; and page 166, R. C. Snider. . . . Art Spot page 170, from Television for Children (the Foundation for Character Education, Boston), Walter Lorraine artist.

School Legislation in Fluid State: As this issue goes to press the House and Senate are completing hearings on the Administration-supported school bill amidst certain expected backfirings such as the parochial school issue, segregation, states rights--and Barry Goldwater. Known as the "general support bill," the Administration measure (which also has NEA backing) would provide funds for both school construction and teachers salaries. Copies of the bill (S1021 and HR4970--it's identical in both houses) are available free on request from the Legislative Division, NEA, 1201 Sixteenth St., N.W., Washington 6, D.C.) While the fate of the general support bill hangs in the balance, so do several other educational measures. The prevailing attitude seems to be one of "wait and see" what happens to the administration measure before pushing other interests. (This applies to the NEA, although spokesmen for the organization have indicated it will definitely support both the Magnuson ETV bill and NDEA extension.) Meantime NAVA News (February 27) interprets optimistically the language of the Administration measure, citing in particular the definition of the term "construction" to include the acquisition of "school facilities" which is further spelled out to include "instructional materials other than textbooks." NAVA News also sees promise in Section 109 which would allot 10 percent of the entire appropriation towards paying "part of the costs of pilot, demonstration or experimental projects to develop or evaluate public school programs of special or unique nature." This,

simplicity



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NAVA News points out would make some $200 million available for research and experimentation in a number of educational areas, of which AV would definitely be one. . . Meanwhile Congressmen Kearns and Van Zandt of Pennsylvania have introduced bills for limited expansion of NDEA (HR4253 and 4361, respectively). The Kearns bill would extend Title III to include English, providing an additional $6,500,000 per year for equipment and materials. The Van Zandt bill would renew for four years adding a $5,000,000 appropriation under Title VI for materials and equipment for teaching modern foreign languages in colleges and universities. These bills are not however expected to claim serious consideration before the Administration proposal for NDEA extension is received and aired in hearings before both houses. . . While the situation thus remains fluid, the time is ripe for action on the part of DAVI members. Let your Congressmen know that you have a strong interest in the pending school legislation and precisely in which area this strong interest lies. . .
Bill King, Legislative Chairman, reports that DAVI as a body will probably go on record at the Miami Convention as favoring NDEA extension for five years, with certain revisions. At the request of the DAVI Board, the Legislative Committee has submitted the draft of a resolution which will be presented to the business meeting in Miami. Roughly, the resolution will call for expansion of subject areas covered in Title III beyond science, math, and foreign languages--DAVI has not spelled out these areas but social studies and language arts have been mentioned. The resolution also asks that increased attention (i.e., more funds) be given to dissemination of information about the new media and that teacher-training institutions be made eligible for funds (the argument here is that only through teacher education will proper use of AV materials be insured). Cognizant also of the leadership value of the guidance and language institutes under Title V and VI and the Title IV fellowship programs, the resolution calls for similar provisions to cover the new media. DAVI members will want to be on hand when these and other resolutions important to the profession are presented to the business meeting.

PROFESSIONAL PLACEMENT

POSITIONS

Director of AV Center and Assistant Professor of Education: Man, 30-45; master's degree or doctorate in education; emphasis on curriculum, audiovisual, TV, and if possible some work in teaching machines; knowledge of photography essential. Prefer candidate from large school system or smaller college. Teaching responsibilities include introductory graduate course in AV education and course in preparation of simple AV materials; will direct AV center servicing entire University faculty; may work with University's closed-circuit TV operation and will be expected to assume leadership for developing use of teaching machines. Prefer to fill vacancy June 12; otherwise September 11. $6500, Midwest. Box No. P-17.

Audiovisual Salesman: Man, 23-40; bachelor's degree with training in AV instruction and materials. No experience necessary but must have interest and aptitude for selling to educational field. Duties include selling AV equipment and materials to schools and churches; should be able to do minor servicing. Approximately $100 per week plus expenses, open at once, Midwest. Box No. P-18.

APPLICANTS

College AV Instructor or AV Director/Production Specialist for Public School System: Man specialized in AV and TV utilization and production. Master's degree in secondary education (audiovisual); 1 yr at large Eastern university teaching courses in basic AV and still and motion picture production; 1 yr CCTV research in small Southern university. Recipient of 1960 DAVI Helen Rachford Scholarship award. 30, single, $7000 minimum, available immediately, any area US or overseas but would prefer Midwest or Eastern states.
Box No. A-27.

Director of Public School or College Communications Program: Man specialized in teaching machines and programmed instruction, language labs, TV, production, graphics, research, film library, AV utilization and math education. MS plus 40 hrs; superintendent's certificate. Experience as public school AV director, university teaching and AV administrator, State Education Department communications administrator. 33, married, $8500 minimum, available early summer or fall, will go anywhere. Box No. A-28.

What Makes a Teaching Machine Teach?

Some basic principles as reviewed by William G. Henry, Jr.

THE CONCEPT OF SELF-INSTRUCTION and the wide attention it is receiving today is really not as alarming as it appears. The large number of publications in the past half-century guaranteeing the achievement of almost any skill or educational foundation through "ten easy lessons" should be convincing enough that we are in no way experiencing a revolution. As early as 1872 the catalog of G. P. Putnam and Sons carried an entire section of self-instructional type materials under the category of *Putnam's Handy-Book Series.* It may be interesting to note too that in this series a booklet entitled *How to Educate Yourself* was expressly devoted to the concept of self-instruction and by this date had already entered its fifth edition.

Fattu suggests that the concept of self-instruction has been evident for more than a century and traces its possible beginning to the realm of "educational" games and mechanical toys. However, the self-instructional device as it is known today—as a product of technical origin and pedagogical emphasis—spans less than a few decades and is indeed "new" by any chronological standard.

A self-instructional device, more popularly referred to as a "teaching machine," is genotypically defined by Fry and others as a device "which (1) presents a unit of verbal or symbolic information visually, usually in question form; (2) provides the student with some means of responding to each unit; and (3) informs the student as to the correctness of each response." Considered in this context, such a device parallels very closely the requirements of the instrumental learning situation initiated by Thorndike and later established by Pavlov the traditional stimulus-response-reinforcement concept of conditioned learning.

In this frame of reference, the origin of our present-day "teaching machine" can be clearly established in the works of S. L. Pressey who in 1926 constructed a simple apparatus which he described as being able to "give and score tests . . . and teach." And although Pressey did not support this statement with sizeable research at this early date, it is obvious upon considering the construction of these devices (which functioned on a multiple-choice principle) that they could be used in some testing situations. Their teaching value, on the other hand, was investigated by Fry and, as discussed later in this paper, was found to be questionable. Nonetheless, the fundamental ingredients of instrumental learning were at least combined into one single device, hence satisfying the accepted definition.

Since Pressey's early apparatus the development of teaching devices is characterized by greater refinements both educationally and technically. However, according to Carr, the fundamental components still remain essentially the same, that is: a stimulus or *program* which is designed to elicit a reaction; a *display* by which the program is presented; a *response panel* which the learner uses in forming his responses; a *confirming mechanism* which provides the learner with information as to the correctness of his response, and a *reinforcement mechanism* which provides the impetus for further operation of the device.

With these basic components as a framework it should be possible to develop a fairly conclusive discussion of this field and its educational implications, as well as to construct a comparative analysis of some of these devices which are presently in production.

(See list of manufacturers, page 144.)

The stimulus can take the form of visual or verbal display, or combination of these.

Mr. Henry, who is finishing his doctorate at Indiana University, writes that his article was largely inspired by two DAVI publications: the Lumsdaine-Glaser volume (TMPL, as it is now called) and the Fry bibliography (Supplement 1 of Vol. 8, AVCR). His other references are found on page 145.

Major Components

The Program: Of the many technical terms used in the teaching device field, the word program or its gerund, programming, perhaps needs more explanation than any other. Rigney cautions us that "when used by a teaching machine writer, a program refers to the curriculum material or subject matter which is placed in the machine and which is usually carefully worked out and composed of items on which the student can be successful a high percentage of the time." The physical form varies according to the type of machine for which the program is prepared. Memory drums, rotating discs, 16mm and 35mm film sequences, 2 x 2 slides, paper (sheets or folds), index cards, magnetic tape recordings and books are among the forms in which programs are either available commercially or used as research study instruments.

Although researchers in the teaching machine field are not yet fully agreed as to what physical form a program should take, agreement appears to exist on at least two basic principles. Blyth identifies these as the necessity for the program to "start with something familiar to the student" and then to be structured in very small steps "graduated in difficulty so that the student may take each step for himself" with reasonable assurance of responding correctly.

These features are clearly supported by Keislar's study of the development of arithmetic understanding. Here 14 subjects from the fifth and sixth grades were taught multiplication and division by use of a filmrater, programmed with word problems, while 14 matched controls received regular classroom instruction. Results from pre- and post-tests indicated that the experimental group progressed much further than the control group. However, an analysis of the individual program items led to the conclusion that this progress could have been much greater for some of the subjects had the "size of step" within the program been smaller.

The program is the thing—here machine takes simple form of "Slide-a-mask."

Other principles that have become intrinsic to program construction are cueing, prompting, and vanishing. Lumsdaine contends that "perhaps the most important single factor in constructing programs is the use of prompts or coaching cues, of varying degrees of subtlety and indirectness, which are used to keep the learner responding correctly and to keep up his motivation by insuring successful performance."

Skinner modified this approach by using a principle labelled "vanishing." The process of vanishing performs the same function as a cue but is more subtle in that after achieving a desired number of responses it is tapered off and faded out of conscious use. The distinguishing feature of these two principles may be worth noting: In vanishing the technique is essentially a visual form of cueing, whereas in prompting, cueing is generally achieved at the verbal level of interaction.

One final principle of programming, the concept of branching, deserves mention here for to many students of the field this represents the first real step towards replicating the ideal tutoring situation where student-teacher exchange is at its height. Branching refers to a type of programming which is designed to anticipate responses and adjust stimulus sequences accordingly. Each response to the questions in a branching program is, in a sense, subjected to a diagnostic evaluation that results in the subject being either presented remedial materials or accelerated to more advanced material. Operationally, this feature puts the program sequence indirectly under the control of the student and in so doing provides the flexibility so necessary to satisfy the problem of individual differences.

The art (or science) of programming at the present time is still definitely in the metamorphic stage. One can, however, detect a thread of continuity among the many different views advocated. And not at all surprising, this thread is recognized as one of our fundamental notions of learning, the empirical Law of Effect —the thesis projected by Thorndike which holds that a subject learns largely by choice, his own personal choice.

Guthrie, according to Glaser, offers further support of this thesis by saying that "a student does not learn what is in a lecture or book (or teaching device program). He learns only what a lecture or book causes him to do." It appears (from these words at least) that the power of persuasion can also be considered intrinsic to effective programming if the desired response is to be achieved with any degree of consistency.

Stimulus Display: Display as it is used here refers to the means of presenting the stimulus or program. The manner of display, like the other basic components of the teaching device, is a variable depending upon the design of the device. Since the stimuli can range from a very short statement or question to a number of paragraphs, utilizing either the visual medium, verbal medium, or a combination of these, the means of presentation can be said to depend largely upon the manner of programming involved.

Carr reports Porter as having distinguished between two important modes of stimulus presentation. The

Professor Pressey and Prototype

first he called "learner-paced," where the device waits upon the learner to respond before it reacts; the second is called "machine-paced," where a given problem is presented for a period of time after which the machine reacts whether or not the learner has responded.

As it stands now, much more research on the variable of stimulus presentation is needed, particularly from the human engineering standpoint. Investigations of this type are likely to supply more effective means of determining how presentation itself can serve as an influence on the mode choice of other variables such as response characteristics, the type and amount of subject matter to be learned, and the peculiarities of the learner.

Response Panel: The response panel, or performance acceptor as Fattu prefers to call it, is the device by which the machine permits the student to react in some fashion to the program items. The various possibilities of responses, he points out, include pressing a button, using a chemical, erasing a covering of ink, punching a hole, writing a passage, sliding numbers into position and "pushing a series of buttons singly or in various combinations to cause a certain light or series of lights to go on in the logical analysis device."

On first consideration, this array may seem to be nothing more than the outgrowth of the mechanical aptness of the individual machine designers. And this consideration may well be very descriptive, at least for the early developments in teaching devices. On further analysis, however, there appears to be a very distinct dichotomy—that of "constructed" versus "multiple-choice" modes of responses—and the question as to which of these is of greater educational significance.

Recent studies designed to test these questions, especially those conducted by Fry and Evans, failed to provide conclusive results. But they did in effect supply good reason to consider this dichotomous nature as a plus factor. In the study reported by Evans, who utilized programs designed to teach 15 rules in symbolic logic to six groups, each varying according to their modes of responding and receiving reinforcement, the criterion performance in terms of error scores was not significantly affected by mode of responding (including no overt responding at all). Conversely, Fry found that constructed training responses result in more learning than do multiple-choice responses if the criterion of learning is recall. And from the results of his study concerned with teaching Spanish words and phrases to 153 ninth-grade beginning Spanish students, he recommends that "where it is required that students be able to recall the learned materials *unaided*, constructed training responses should be used."

Skinner, an advocate of the constructed response, labels the multiple-choice devices of Pressey and others as "testing" devices and sums up his contention in these words: "By confirming correct responses and by weakening responses which should not have been acquired, a self-testing machine does, indeed, teach; but it is not designed primarily for that purpose."

Extrapolating then as did Gilbert in his somewhat humorous critique of this field, one feels tempted to conclude this discussion of response modes by facetiously suggesting that we have at last discovered the ideal teacher replacement. Two machines—one to teach, the other to test!

Confirmation and Reinforcement Mechanisms: If for the purposes of discussion the criteria for learning can be reduced to the basic concept of stimulus-response-reinforcement, it should be easy to point up the importance of the confirming or reinforcing provisions of teaching devices. The need for receiving some type of reinforcement in reply to a given response is by now axiomatic in the area of learning behavior. Organisms just do not react for the simple purpose of reacting. Some form of benefit is inevitably realized. And to the degree that this reinforcement can be weighed in terms of amount and immediacy, the peculiarities inherent in teaching devices complement the behavior of learning to a satisfying degree. Like the ideal learning situation, teaching machines, through the development of pro-

gram material, are engineered to satisfy the "amount" factor by assuring frequent correct responses and the temporal factor by providing for immediate evaluation of responses.

The importance of immediate reinforcement was investigated by Little in 1934 in a study designed to compare the effects of three methods of correcting responses to tests. The students involved were enrolled in a course in educational psychology. Students in Group I, using a mechanical test-scoring (punchboard) device received immediate reinforcement plus the opportunity to correct deficiencies through make-up tests. Students in Group II used a multiple-choice drill device and were allowed continued drill on errors. Tests administered to Control Group III were graded in the usual manner: collected, scored, returned the following day, with no make-up permitted. Little found that students who received immediate appraisal of their responses plus the opportunity to correct deficiencies profited markedly in terms of final examination results over other students. The greatest benefit accrued to students who usually scored in the lower half of the experimental groups, although all groups moved upward.

In addition to considering reinforcement in terms of the traditional variable-time and variable-ratio scales, it is interesting to note that an overt-covert means of comparison is also applicable. Reward characteristics can take on the form of flashing lights, bell tones, the vending of candy and marbles, or audio-verbal evaluation. In contrast is the alternative of providing evaluations by merely exposing the answer through exposing more of the program.

In a study by Ferster and Sapon in 1958 the covert means of reinforcement is clearly validated. The experiment involved a group of 28 volunteer undergraduate and graduate students from various schools of Harvard University to whom introductory German was taught entirely by linear programming. Subjects working with short German phrases translated them and compared their responses to those contained in the program. Incorrect responses were corrected before moving to new phrases and were strengthened by the opportunity to repeat any part of the program as many as seven times.

Subjects worked at their own discretion concerning time and place, and at no time were they provided with supervision or instruction by a teacher. Results of tests which included both vocabulary and translation exercises indicated that after an average of 47.5 hours of work, these subjects learned German in amounts comparable to a first semester course supervised by an instructor. Despite the fact that no formal supervision was provided, the experimental subjects inductively mastered such concepts as gender, verb transitivity, morphology, and syntax of the German case system and word order.

Porter asserts that only two forms of reinforcement are explicitly produced by teaching devices: manipulation of the machine itself and mastery of content. Hively illustrated the former in a study which involved teaching visual discrimination to preschool children. Porter writes: "The mastery of the educational content is of still greater reinforcing value, especially since the student is constantly made aware of his progress through immediate confirmation of the correctness of his responses."

As early as 1916, John Dewey discussed the topic of knowledge as we are considering it here with these very appropriate words . . . "the development of the experimental method as the method of getting knowledge and of making sure it *is* knowledge, and not mere opinion . . . is the remaining great force in bringing about a transformation in the theory of knowledge." Teaching devices as they are interpreted today may be able to aid immeasurably in this process of transformation by strengthening the scientific approach to the study of learning behavior at the human level of investigation.

Analogies drawn between the response formation of pigeons in Skinner Boxes and the acquisitions of a relatively complex response in humans has, no doubt, been too frequently misconceived. The strict item-by-item comparisons are, by rights, impossible and in many ways impractical. However, the value of such analogies should be of some significance if we continue to hold to the premise that there is among all living beings a continuity of behavior that is basic and indeed comparable.

After more than a quarter of a century of work in this area of mechanized self-instruction, Pressey reminds us that machines are not going to make unnecessary "either educative contact with reality, competence in reading, sociality, or adjustment to individual differences."

"The teaching machine is no Frankenstein monster threatening all present texts, materials, equipment, and methods, and even many teachers," Pressey writes in one of the concluding chapters of the Lumsdaine-Glaser volume. "Rather, automation should be the greatest help the schools ever had. Only continuing cooperation between automators and educators is needed to make it so." (See references, page 145.)

Inner workings of more complex machine—Western Design's AutoTutor

"the burden of learning is on the machine"

PROGRAMMING
A Re-emphasis on the Tutorial Approach

David J. Klaus

SEVERAL IMPORTANT questions are frequently asked by educators about programmed instruction: What are its essential characteristics? How valuable is the method? How are the materials prepared? and, What are the potentialities of the technique? None of these questions can be answered fully at this time. However, many of the research studies on auto-instruction conducted by the American Institute for Research were designed to clarify these issues. On the basis of one of these studies in particular, I feel we have sufficient experience and evidence to hypothesize at least partial answers to these four questions.

Arthur Lumsdaine and I have recently completed portions of a large-scale experiment involving the use of auto-instructional materials in ongoing educational situations. This study was sponsored by the U. S. Office of Education, under Title VII of NDEA. In brief, we prepared six weeks of high school physics in auto-instructional form—the course units on static electricity, optical reflection, and optical refraction. The materials were then reproduced and distributed to a number of physics classes in the Pittsburgh area.

Our data and observations are particularly relevant to the educational implications of auto-instruction since, in this instance, the materials were used by representative students in representative classroom situations. Altogether, 25 physics classes, representing 17 different schools participated in the study, a total of roughly 650 students. On the basis of this investigation and some subsequent work, it is possible to propose interim answers to the questions about auto-instruction that many educators may have.

To return to the first question posed above: What are the essential characteristics of auto-instructional materials? Psychologists are working diligently on this problem and we now have a much better idea of what programming is than we had a few years ago. Most readers of this magazine have seen at least one example of material prepared in auto-instructional form. The rash of popular articles on the subject has fortunately made available sample frames from many auto-instructional programs. For reference, however, a few frames, or items, from our physics program are contained in Figure 1.

Dr. Klaus is associate program director for training and education at the American Institute for Research in Pittsburgh. *His article was presented as a paper to the Regional Information Conference on Research in Newer Educational Media at Pennsylvania State University last October. Its original title: "Some Observations and Findings from Audio-Instructional Research."*

These frames appear early in our unit on static electricity. As you can see, the student is led progressively, by carefully sequenced steps, from very simple material to that of a high degree of complexity. Frames A-1 and A-2 are the first two frames in the program. While the student doesn't actually learn much in these two frames, he gradually builds up his knowledge and understanding of physics with frames such as A-5 until by the time he has arrived at frame A-33, he can correctly state: "The general rule for attraction and repulsion is that like charges repel and unlike charges attract." As he proceeds through the material, the student is forced to respond frequently and since, in practice, he is given the opportunity to confirm each answer, he is provided with a reinforcement or reward for each correct response.

These particular characteristics of sequenced steps, frequent responding, and immediate reward are common to almost all materials called auto-instructional programs.

An examination of a variety of these materials suggests that two rather independent educational trends are represented by the auto-instructional approach. The first is no more than an extension of what has been a traditional part of education for many years. Children do obviously learn from textbooks, workbooks, and their teachers. The fact that programmed material is carefully sequenced, that it encourages active student response, and that it provides confirmation for correct answers certainly does not represent an innovation in education. What is new about this first trend, however, is that programmed materials can systematically accent step-by-step tutorial instruction to a degree which most teachers find difficult to attain.

A-1

A very important discovery in physics was the mutual attraction of objects due to static electricity. If we rub a hard rubber comb with a wool cloth and hold it over bits of tissue paper, the comb will attract the paper. This attraction illustrates _____ electricity.

A-2

At parties, you have probably seen someone rub balloons against a wool rug to make the balloon stick to the walls or ceiling. This is another example of _____

A-5

Static electricity can also cause objects to *repel* each other. When a comb rubbed through fur is brought near another comb rubbed through fur, the combs will not attract each other but will _____ each other.

A-33

The general rule for attraction and repulsion is that _____.

FIGURE 1

The second trend, on the other hand, is *more* than an extension of traditional educational practices. Psychologists are now sufficiently aware of the conditions affecting learning to control the acquisition of knowledge more systematically than ever before. By carefully applying this knowledge to the problems of education, we can look forward to substantial increments in student attainment. Let me repeat that this second trend did not evolve from the tradition of education. Rather, it is an outgrowth of our knowledge as to how learning takes place in the laboratory.

Until recently, the work being done by psychologists with laboratory animals was not considered especially relevant to the education of human beings. We now have sufficient evidence, however, to be able to state that the principles of learning, whether discovered with pigeons or white rats or chimpanzees, hold even when applied to complex human behavior. This is not to say that humans and animals behave identically, but rather that the rules of learning are the same for both. This approach enables us to use our knowledge of behavioral science as inputs to education.

The basic premise in this second trend is that in teaching we are obliged to guide or assist the student's learning in two ways. First, we must give him guidance as to *what* to learn and then we must give him guidance as to *how* to learn. This is the distinction between a lecturer and a tutor. The tutor not only provides the facts and concepts to be learned but he actually helps the student learn them.

As he would if he were working with animals, the programmer should assume that the responsibility for learning lies with his techniques and not with the student, that is, a failure to learn can only be attributed to the method of instruction.

The emphasis sometimes placed on various failings of the student—such as his lack of interest, attention, or encouragement from home—may be a convenient way of explaining why a student has not learned as he should, but this does not eliminate the need for positive, corrective action. Some programs, unfortunately, are being prepared which *still place the burden of learning on the student*. The student reads a passage, and then, *if* he has learned, he is able to answer a question on the paragraph correctly. In this way he does, of course, have a good measure of his progress, but he is not helped to learn any more than if he were reading a textbook.

A properly prepared program, then, has two important characteristics. First, it presents the material to be learned in as optimal a fashion as possible. And second, by taking advantage of what is now known about the rules of learning, it endeavors to insure that learning will occur.

As to the second question—What can be expected from programmed instruction?—let me return to our study on physics. In the first portion of the experiment, all of the students in 15 participating physics classes had the benefit of their regular instruction as provided by their teacher, daily televised lectures in physics, a textbook, and laboratory exercises. Some of these students were, in addition, provided with portions of our specially prepared physics materials. At the completion

of each unit of the course, the students were given an objective achievement examination based solely on the material all students had been exposed to through television. Those students who had the supplemental auto-instructional materials did substantially better on these tests than did the remaining students. These results are especially encouraging since the student's use of the special materials was not mandatory. Our first conclusion, then, was that auto-instructional methods can produce increments in achievement even when substantial efforts had already been made to maximize learning.

Programmed Materials Found Adequate

In the second study, all students in 10 other physics classes which did not use television were given the special programmed materials, but only some of these students received their normal classroom lectures and recitation. In this portion of the study, we found that both groups received practically identical scores on the achievement tests given. Here, we found no evidence to suggest that a human teacher would provide instruction, at least with respect to materials such as physics, that could not be presented by means of an auto-instructional program alone.

To repeat, from these studies we are able to conclude that when used as a supplement to an otherwise full program of instruction, programmed materials do add significantly to student achievement and, furthermore, the evidence suggests that auto-instructional programs may be relied upon to provide instruction, in physics at least, independent of classroom lectures and recitation.

The third question asked how programmed materials are prepared. Again using our physics program as an example, the procedure was to begin with a carefully prepared outline as to what objectives we wanted to reach. As a basis for this outline, we used standard textbooks, an expert physicist, and the scripts of the television series mentioned earlier. Using the outline, we then prepared sections of the program in draft form. These preliminary frames were tried out on individual students and were extensively revised and edited according to how these trial students responded, always with the assumption that if learning did not occur it was the fault of the program and not of the student. The frames were then given further tryout, with additional editing, until we were convinced that the program was as satisfactory as we could make it. Last came a final check by the physicist to insure technical accuracy, and only then did we make the materials available to the schools participating in our study.

As might be expected, the most difficult step in this procedure was the actual writing of the frames. After the materials were completed, an effort was made to identify the characteristics of a good frame. Our first observation was that the most frequently made writing error of all was to assume that the learning took place while reading rather than while responding. Too often the frame is written first and then an effort is made to find a word or two which can be left out and used as the response. We found the best way to write a frame is to begin with the response aimed for, and then develop the remainder of the frame with that goal in mind, adding only as many words to the frame as necessary.

Some words must appear because a response must occur in context before it can be of any use to the student. The response "static," for instance, is only correct when it appears in a particular verbal context, such as the second and third sentences of the first frame in Figure 1. Psychologically, context can be defined as the setting in which we hope a particular response will readily occur after learning. In arithmetic, for example, "two plus three" is the context in which we hope the response "five" will be forthcoming.

The next problem is to get the student to emit the proper response. To provide this help we furnish the student with cues. At first, these cues are very pronounced but as learning proceeds, we can diminish their strength until the student can respond correctly to the proper context alone.

In these terms, then, an ideal frame consists of three components—a response selected beforehand, some context or new setting in which we hope the response will occur, and sufficient cues to produce the response that is desired. In some cases, we may include some enrichment material which has nothing to do with the learning but which is included for motivational or interest purposes. Everything else in a frame, we found, is superfluous.

Aside from this rule, we observed one other characteristic of a good frame: while essential, the cue should be as unobtrusive as possible. The two frames in Figure 2 illustrate this point.

Example X

Fahrenheit and centigrade are scales of temperature; Kelvin is a [ ].

Example Y

Fahrenheit and centigrade are scales of temperature; Kelvin is also a [ ].

FIGURE 2

Example X is a poorly cued frame. In fact, it resembles a test question rather than an aid to learning. By adding a single word, however, example Y illustrates a very good frame. It is almost impossible for a student to answer it incorrectly even if he has never seen the word "Kelvin" before. These few principles are only a beginning of a science of auto-instructional programming. As more and more rules are discovered, however, it will be possible to provide ever clearer answers to the question of how frames are written.

An answer to the last question—What can be expected from auto-instruction?—depends largely on the subject matter involved. Through our investigations, we have been able to identify three levels of programming. Each of these may involve a different set of operations and may produce different results in empirical tests of their effectiveness. The first level involves what is commonly called rote learning. Examples of subject matter in this category are foreign language vocabulary, arithmetic, spelling, and the facts of history and geography. In most cases, except for the way this material is sequenced and reviewed, it is not likely that auto-

(Continued on page 148)

A Simple Device for Skinner Disc Programs

Laurence G. Goebel

FOR SOME TIME I have been concerned over the rash of expensive gadgets produced for working with self-instructional techniques. Many of them are simple devices that do no more than the one I describe in this article, yet they are offered with price tags from twenty to forty and even fifty dollars. This is discouraging to real investigation of the possibilities inherent in these techniques.

It has become almost standard practice for anyone initiating investigations in the automated teaching area to secure the Skinner-Holland disc program for study. In operational use, this program is taught via a machine that maintains a record of student responses and automatically drops out the items mastered. The machine is expensive and unnecessary for teachers and educational researchers who want to analyze the program. The device I describe will serve the same purpose and can be fabricated in less than an hour from about a dollar's worth of materials.

Obviously, the disc program could be retyped on standard paper and a manila folder prepared as a suitable mask; however, the disc program consists of some 57 discs, each of which contains 29 questions. Retyping might be quite a chore.

A major need now is for more people, particularly classroom teachers, to develop instructional programs in a wide variety of subject matter. Such efforts should produce a great deal of new knowledge about the learning process and how it can be facilitated. I do not believe educators should be led to believe that they need expensive gadgets for this purpose. Some excellent studies can be done by using cheap 5x8 cards.

Materials required for the simple device illustrated on these pages are three sheets of double-thick (⅛ inch) illustration board, 13½ inches square; one sheet of heavy, clear acetate, 13½ inches square; one 1-inch aluminum post binder of the screw variety; about 24 inches of plastic Mystik contact tape or similar librarian's binding tape, about 2 inches wide; glue.

The base (A in Figure 1) is composed of two of the sheets of illustration board glued together. Prior to gluing these sheets together, cut the head off the aluminum binding post and fasten it in the center of the top sheet with the screw portion. This serves as a post for centering and holding the program disc.

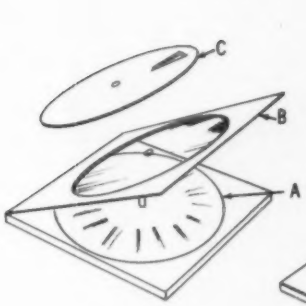

FIG. 1

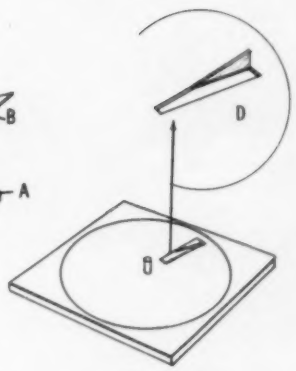

FIG. 2

The third sheet of illustration board is used for the cover (B, Figure 1) and mask (C, Figure 1). First cut out C. This is a circle about 12¼ inches in diameter. Then glue the sheet of acetate to the underside of B and cut a half-inch diameter hole in the center. A large-size gummed cloth reinforcement, such as those used for loose leaf notebook papers, may be glued over this hole to reinforce the acetate if desired. In use, the acetate serves to protect the set of questions against abrasions as mask C is revolved. The cover (B, Figure 1) is attached to the base A as shown in Figure 1 by the plastic tape which forms a hinge.

Figure 2, D, illustrates the slot in disc C through which the program items are read. Dimensions necessary for this slot are best determined by measuring the space occupied by the longest question appearing on the teaching disc. In the device on which this article was based, the slot is cut ¼ inch from the edge of the disc and is 4½ inches long. The end of the slot nearest the center post is ⅜ inch wide and the end near the edge is ⅝ inch wide. The small, shaded triangle shown in D is a tab cut from the slot and hinged with a bit of plastic tape. It acts as a mask for the correct response.

In use, a set from the Skinner program is inserted in the device, using the aluminum centering post. Cover, B, is lowered over the program set and then disc, C, placed over this. The operator revolves C to an item, responds by writing his answer on a separate sheet, then checks his response by lifting the masking tab, D. He continues through the entire set in this manner. By simply increasing the width of movement of the tape hinging the cover and base, it is possible to permit insertion of the entire program of discs at one time. Then, as each disc is completed, it may be removed.

Captain Goebel is a research psychologist with the U.S. Air Force.

She has her own private tutor—
her teacher's voice.

A Second Teacher

A self-instructional device created from a tape recorder and teacher ingenuity

Nancy H. Davis

TEACHER, how do you do this problem? Teacher, what is this word? Teacher, help me! help me! Do you often wish that you were two people?

Use a recorder.

Let the recorder direct one group of children while another reads to the teacher.

The children beg to use it. They think they are pilots with their earphones on. The wiggly ones do not wiggle as much. The interrupters do not interrupt. The dreamers stop dreaming. The teacher is talking in the child's ear. He feels he has his own private tutor. The earphones shut out any possible disturbance from other groups reading in the circle.

The device can be used for reading, arithmetic, science, or language arts. It is particularly effective in connection with phonics. It can be used at any grade level. The recording can be made at any time and kept from year to year. The teacher has an opportunity to record and polish her best lessons.

Using the recorder with a filmstrip machine or book is one of the best possible ways of learning because you use the visual, auditory, and kinesthetic means of learning in combination. Johnny sees, hears, and writes or manipulates something. A successful example practiced at Lincoln Elementary School is a lesson in which we use small toy airplanes in teaching the number combinations. The child pretends they fly away. He checks his work at the recorder and no longer needs to approach the teacher after each small accomplishment. He is content to wait until he has finished the entire set.

The best part of all this is that at the end of the day the teacher is not so often compelled to say: 'If I had had more time I could have helped Johnny when he needed it."

Here are sample lessons which can easily be prepared by any resourceful teacher who is willing to delegate part of her classroom duties to a "second teacher."

NAME OF RECORDING: Drop of Water

GRADE LEVEL: 1 through 6

SUBJECT AREA: Science

MATERIALS NEEDED: Tin pie plates, small birthday candles, colored pencils, wax paper cut in approximately 3" squares, small pieces of printed newspaper, detergent or soap, water.

SOURCE OF INFORMATION: "Water, Water, Everywhere," by Harry Milgrom, *Elementary School Science Bulletin*, February 1959, page 8.

SCRIPT: Dip your fingers in the water and sprinkle it on the wax paper. Use very little water. Look at the wonderful shape of the drops. Are the small drops as round as the large ones? See how the drop glistens and shines. Touch

Mrs. Davis is a second-grade teacher in the Lincoln Elementary School in San Bernardino, California.

one of them with a colored pencil. Do you see you now have a colored jewel?

Take a small piece of newspaper and put it under one edge of the wax paper. Slip it under. Be careful not to make all the drops move away. Look at the print through one of the drops. See what has happened. Do the large drops magnify more than the small ones? Do the letters look larger?

Pick up your colored pencil and use the unsharpened end to push one of the drops off the wax paper onto the newspaper. You can use your finger if you wish. What happened to the drop? Does it have the same shape it had on the wax paper? Is this how water spreads in the soil to reach the roots of plants? Plants need water to live and we need plants. We could not live on this earth without plants. This will perhaps help you remember to turn off faucets and not waste water. We must "Nip the Drip," especially in the spring and summer.

Use the unsharpened end of your pencil or your finger to push two drops together. What happened? When the two drops became one there is a bigger heavier drop. Now think about a cloud in the sky. It is made of very tiny drops of water and when those drops come together they become heavy and fall to the ground. We call it—what? . . . Move two more drops together and think about clouds and rain.

Pick up one of the birthday candles. Use the pointed end. Touch a drop. Notice it wiggle. It seems to be alive. It appears to have skin. The wax paper and wax candle do not absorb water. They do not soak it up. Why do you wear a raincoat rather than a sweater when it rains? Did you say to yourself that the raincoat is like wax paper and the wax candle? The water will not soak in and get me wet? A sweater would soak up the water and I would get wet? If you did, you are right and you are a good thinker.

Reach over and get a pinch of soap, detergent. Put a speck on one drop of water. Then compare its shape with the others. See, the soapy one wets the wax paper. This is why a combination of soap and water together take the dirt off your hands much better than water alone. The next time you wash your hands try using no soap at first and then use soap. See how much cleaner your hands are when you use soap.

This time you are going to pretend that you have a magnifying glass or a microscope and you look at one of your drops of water. Did you know that you would see many living things wiggling around in the water? There are many small living things inside this drop of water.

Let us see what we have learned from a few drops of water:

(1) A drop of water is beautiful; (2) A drop of water magnifies; (3) Many small drops come together in a cloud and make—what? . . . Did you say rain to yourself? (4) The drop has something that holds it together like what? It begins with *s*. Did you say *skin?* (5) Soap breaks the *s* _ _ _? Skin is right. (6) Water spreads into the soil and helps plants to gr _ _? *Grow* is right. (7) There are many living things in a drop of water.

Be sure to leave the table in order for the next group of children. If your teacher is busy with the other children, get a book and read. Quietly take off your earphones and turn off the recorder.

NAME OF RECORDING: Reading in *We Three* Emphasizes Phonics.

GRADE LEVEL: 1, 2. Phonics review for grade 3, a slow group.

MATERIALS NEEDED: *We Three*, William S. Gray and others, Scott Foresman, 1947.

SCRIPT: Open your books to page 14. . . . Look at the picture. Do you think that little girl is about Sally's age? The umbrella is almost as big as she, isn't it? Let's find out her name. Find the last two words of the first line—the last two words of the first line. You know that *b a b y* is baby don't you, but the next word may be new to you. Put your finger over the "P." Do you know what *a m* is? "Am," isn't it? Now lift your finger and tell us what the word is. Did you say "Pam"?

How can you tell that someone is talking? Notice the little quotation marks beside the first word, beside "this" and following "fun." Remember they are called quotation marks and they tell you that someone is talking. Read what Baby Pam is saying. Would you like to walk in the rain under that big umbrella? Can you find the word *round* in the fourth line? How many times can you find it? Two is right. Now find *yard* in the same line. Remember it starts with a *y*. Read the fourth and fifth lines to yourself. Read the next line. Find the sentence "All at once it began to rain." Find the last word in the next line—the one that ends with *ing*—three lines from the bottom of the page. What is the root word? Cover *ing* and you will see it. Did you say "walk"? Now lift your finger. Say the word "walking." Read the whole line, "But Pam did not stop walking."

Shall we see if you are a good detective? Look at the next word. How many vowels are there in this word? Just the *a*. What is one of your clues? The *a* will have a short sound as it does in "cat." What is the word? . . . "Pat?" You are right. Read all of the line. Tell me how her feet went. What sound would you hear if you were there? We will need to be a detective again. Can you solve the mystery of the next word *p - -*? You can use the same clue you used for Pat or you can cover the *P* with your finger . . . do that. What word do you have? *it* is right. Now say the whole word, *pit*. Read the line and find out what sound the rain made.

We are on page 15 now. Read the first two lines and the ones that begin with *soon*. Find out who came to the door and called. What did she say? Read the third line and the fourth. If you have trouble with *wet*, pretend to put on your badge and be a detective. It rhymes with *get*, doesn't it? There is one vowel and the *e* will have the sound it has in *get* and the word is *wet*. Read the next five lines to find out what Pam said. Why did she want to go and see Billy and Ted? Read the rest of the page and find out whether she went to see her friends. Mother said "All right," didn't she?

Turn to page 16. Before you start reading, find the word *h e a r*. See the blank space in the middle of the page? Below those two lines the second word is *h e a r*. Put your finger under it. What are the vowels in this word? *e* and *a*. What clue can we use to solve this mystery? The first vowel will say its name, won't it? It will be the long sound of *e*. The second one will be silent. What is the word? It rhymes with *near*. Did you say it was *hear?* Read this page and find out who was coming up the walk.

On page 17 there is an important word, *f o l d*. It is in the next to the last line. It is the third word. Put your finger on *f o l d*. What clue can you use to solve this mystery? Did you think of this: *o* followed by *ld* is long. It says its name as it does in *old*. There is just one vowel but because it is followed by *ld*, it is long. Put your finger on the *f* and you have *old* left. What is the word? *Fold?* Read this page to yourself. Find out why the boys laughed and laughed.

The true story
of a professor who found
he was doing all the work
while the class sat passively

I Wrote a Scrambled Book

Frank F. Gorow

THIS IS THE STORY of one attempt to utilize the simplest of "teaching machines"—the scrambled book. It began six years ago when the writer volunteered to teach a section of Tests and Measurements to prospective secondary school teachers. The statistics portion of the course was quickly identified as the most difficult and most feared. (A few students seemed paralyzed by the prospect of computations involving decimals, square roots and algebraic concepts.) To the instructor the challenge of developing ready skills and thorough understandings was tremendous. The goal, complete learning by all students, seemed unattainable. Many devices were developed and tried: examples on the chalkboard, problem sheets, a workbook, transparencies and overlays for the overhead projector. Some progress was made but the goal remained distant.

Re-thinking the problem revealed the apparent source of difficulty: the professor was doing most of the work. The students sat more or less passively in the classroom. While statistical processes were being explained and illustrated, some students watched and listened; others feverishly copied every detail, perhaps hoping to memorize it later; and some appeared merely to sit. According to "the theory," students should be continuously active; they should master one little step at a time and know they have mastered it; each student should proceed at his own rate, be it fast or slow.

The content of statistics seemed ideally suited to application of the theory of automated teaching. How could it be applied? With no model to follow and with but a sketchy notion of the "rules of programming" devised by psychologists, we resorted to "intuitive programming." We were unhampered by any particular learning theory. The result was three small and deceptively simple booklets with the general title of *Do-It-Yourself Statistics*.

The plan of the booklets began with a definition of their function. The purpose was to teach statistics to a specific group of upper-division college students (not to prove that statistics can be taught to elementary school pupils). The content comprises certain processes which the instructor believes high school teachers should understand and be able to use easily and effectively; it is not a complete course in statistics. The goals are to achieve more nearly complete learning by more students and to save class time for certain new topics.

The writer can claim only amateur status as a psychologist. This status supports the conviction that as many learning factors as possible should be "built into the machine." Factors derived from the literature include these: (1) The learner is continuously active; i.e., he must be given tasks which require more than passive reading; (2) The material to be learned is organized in small, sequential steps; (3) The learner is tested at each step; (4) Immediate knowledge of success or error follows each step test (some psychologists reject the possibility of learning through error); (5) Each step must be mastered (learned correctly) before proceeding to the next; and (6) The learner proceeds at his own rate.

Program Must Challenge Learner

As a practitioner of psychology, it seemed to the writer that some other factors (seldom or never mentioned in the literature) should also be applied. These were: (1) The program must challenge the learner; i.e., be neither so difficult as to impede rapid progress nor so easy as to insult the learner's intelligence; (2) The program must be interesting; i.e., avoid monotonous routine; (3) Opportunity must be provided for the exercise of reason and not be limited to association or memory; and (4) as a concomitant, opportunity for error must be provided; but when error is made, its nature must be made clear. The error must be corrected and, if possible, a second trial provided.

The first task, breaking down the content into steps, was the easiest. But how small should the steps be? How much reading or explanation should precede a test question? What is to be tested—knowledge of a fact, acquisition of a concept, understanding of a principle, or development of a skill? How can it be tested effectively?

One of the virtues of "intuitive programming" is freedom from a formula or set pattern. Keeping the audience in mind, the first steps were relatively tiny and later steps were larger (some undoubtedly too large for some students). Some of the questions were phrased to

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require merely a "yes" or "no" answer. For example in finding the arithmetical average of a small set of scores:

1. a. Do we need to place them in order of size?
   If you answer "yes" see section #6.
   If your answer is "no" turn to #17.

(Turning to the indicated sections)

6. If you wish merely to add the numbers, they need not be in order of size.
   But if you are looking ahead to the Mid-point and the Mode of the scores, you have a "head start" by arranging them in order of size as you copy them on your paper.
   Return to section 1 (on page 5) and count the scores.

17. Correct—if you are thinking only of finding the A. A.
   However, you will need to place the scores in order of size to determine the other measures, so you can save time by arranging them in order of size as you copy them.
   Return now to #1 b, page 5, and count the scores.

Most of the test questions were framed in multiple-choice form. Where computations were required, an attempt was made to include two or three likely wrong answers (and the correct answer) among the alternatives. Each alternative referred to a section number. These were "scrambled" or scattered throughout the booklet. Each correct answer led to the next step. Each error was explained and referred back to the question for correction. This technique sufficed in the first booklet which includes measures of central tendency and measures of spread of a small sample of data (or a small number of test scores).

In format, the pages are 5½ x 8½ (letter size folded once). Each page may have two or three short numbered sections or a single, longer section. The pages (following the introduction and the first working page) are not numbered. The numbered sections found on each page are indicated at the bottom of the page. A sample of the "program chart" devised by the writer looks like this:

1. A. A.

a. Order of size	6—to 1 b 17—to 1 b
b. No. of scores	23—wrong—return to 1 b 9—correct—proceed to 1 c 13—wrong—return to 1 b
c. Sum of scores	19—1 d 32—1 c 8—1 c
d. The A. A.	7—35—12—41 —20—41 29—1 d 25—41 (which discusses decimal places and leads to the next step)

The sub-steps of No. 1 are all on the same page; sub-steps are not used thereafter. Scattered throughout the booklet are questions which are not answered but which may be discussed in class if any student asks. Thus, we do not expect the "machine" to do the entire job. We believe that some aspects of learning require class discussion and that the instructor still has a function. Each booklet ends with a summary and an assignment requiring computation of the various measures from given data.

Part II (the second booklet) builds upon the concepts of central tendency and variability, applying them to large samples (or to a large number of test scores) after grouping the scores. In programming this booklet, some complications arose. The first process is the preparation of a frequency table. Each of the rules can be introduced and individually tested, but eventually the groupings of scores and the frequencies for each group must be set down. This required a single reference to a correctly-made frequency table for comparison. However, this reference was preceded by a multiple-choice question testing the correctness of the last or lowest grouping of scores.

In developing the steps in computing a measure, such as the Mean, the frequency table was shown in partially completed form at appropriate steps. Much repetition of data in the booklet was required, but the student follows the process from step to step without repetition of his work. Again, multiple-choice questions were used wherever possible to test understanding of each step in a process.

Part III (still in progress) will develop the concept of correlation and present a process which teachers can use without becoming entangled in Pearson's product-moment formula.

As you read this article, the first full-scale test of the technique will have been completed. At writing, it is several weeks off, and a number of questions are still to be answered: Will learning increase over previous methods? Will college students enjoy or dislike the booklets? Will anyone "get lost" or bog down or give up? Can we really "save" four to six hours of valuable class time?

Will the scrambled book type of teaching machine really work?

Why Not Rig Your Classroom Quiz

Simon J. Chavez

The author is professor of education at the University of Dayton, Ohio.

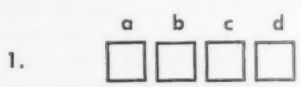
EXAMINATION TIME would be more profitable to students and easier on instructors if a self-scoring device were substituted for the usual paper and pencil test. The learning value of a test is practically destroyed by the lapse between the time the student makes a response and when he verifies its correctness. When he is required to wait several days to see results, any original curiosity aroused by the questions will have been dissipated and his attention detoured to the mark made on the test.

In like manner the instructor finds the scoring of piles of test papers a formidable and frustrating task. Many educators anticipate the day when self-instructional devices with their built-in self-scoring apparatuses will be available to all classrooms. This article shows how the classroom teacher, while awaiting these developments, can with little difficulty use materials at hand to prepare a self-scoring device.

Essentially the device depends on the use of two identical answer sheets. One sheet is superimposed over the other and a piece of carbon paper sandwiched between. The bottom answer sheet will contain the correct markings made beforehand by the teacher. The student selects his choices and marks the top answer sheet. After completing the test he can compare his response to the correct response on the bottom sheet and if necessary refer back to the test item to restudy his response. Such rapid feedback should help the student retain the correct response.

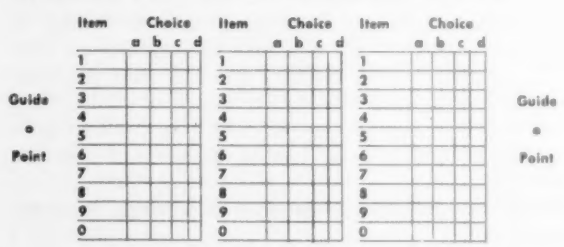
Here in 10 steps is a simple procedure for preparing a self-scoring device:

STEP 1. First prepare a test booklet, with a separate answer sheet. For instance, a multiple choice test booklet would contain the question and choices. The student would mark the selected choice on the appropriate space on the answer sheet as shown below.



In preparing an objective test to be used repeatedly each page should contain only 10 items, numbered from 1 through 0. If each page is coded with a letter, it will be possible to alter the order of the test in subsequent administrations.

STEP 2. The preparation of the answer sheet is crucial. For the greatest convenience use the spirit duplicator. The master should be prepared to give you the two identical answer sheets needed. For multiple choice and true-false items the answer sheet should contain spaces to be checked for each choice. Spaces for 10 answers are grouped together as illustrated here. (Up to 150 items can easily be included in one answer sheet.)



STEP 3. After preparing the answer sheet make two or more marks on the margins which will later serve as guide points in superimposing one answer sheet over the other. Also allow space for the student's name, etc.

STEP 4. When the master for the answer sheets has been prepared, run off the desired number of copies on the duplicator. Those will be the top sheets. It will be helpful if a hole is punched through each guide hole in each top answer sheet.

STEP 5. Remove the master from the duplicator and reattach the carbon to it. Prepare the answer key by making a mark for each correct response. A dot or a small circle is suggested. Duplicate the desired number of copies. These will be the bottom sheet. The bottom sheet is attached to a piece of cardboard or non-transparent paper. This prevents the student from reading the correct answers off the reverse side.

STEP 6. Superimpose the top answer sheet on the bottom sheet. Make sure of a precise match by placing the guide holes of the top sheet over guide points of the bottom sheet.

STEP 7. Insert a piece of carbon between two answer sheets. Place staples or scotch tape on the edges so that the student can not lift top sheet to see answers.

STEP 8. Instruct student to mark his choices with an X.

STEP 9. After completing the test, the student submits his answer sheet to the instructor. The instructor removes some staples and returns the bottom sheet to the student to permit him to examine the completed an-

swer sheet. Correct responses will be shown like this a b c d , since the student's mark will be in the same space as the correct mark. An incorrect response will be in a different space, like this a b c d

STEP 10. Each student can ascertain the correct response on each item he missed by referring back to the test booklet. He then records the number of correct and incorrect responses and returns the answer sheet to the teacher. The teacher can check the scored papers to verify a correct count. The correct markings on the bottom sheet made by the spirit duplicator will be different from the markings made through a sheet of carbon paper which will make it difficult for the student to tamper with the original scoring.

The same procedure can be used with completion items. The answer sheet would contain the space to be filled by each choice, as in the following sample:

TEST BOOKLET

1. What is the capital of Ohio?
2. _____ is the largest city of Ohio.
3. and 4. Akron is best known for its production of _____ and _____ .

STUDENT'S ANSWER SHEET

1. _____
2. _____
3. _____
4. _____

BOTTOM SHEET WITH STUDENT'S ANSWERS SHOWING THROUGH

1. Columbus Columbus
2. Cleveland Cleveland
3. etc. etc.
4. etc. etc.

Using this device, or one similar, should increase the learning value of a test. The student finds it easier to recall the correct response when he sees it soon after his initial trial. The self-evaluation of his response is considerably superior to an evaluation handed down by the instructor.

Although there is a fair amount of work for the instructor involved in preparing and assembling the test device, the anticlimax of scoring is eliminated.

It should also be added that this device is not intended to replace all other types of tests. The multiple-choice type of test described is based on recognition, the completion test on recall. True-false items could use the multiple-choice sheet by referring to a true choice as *a* and a false choice as *b*.

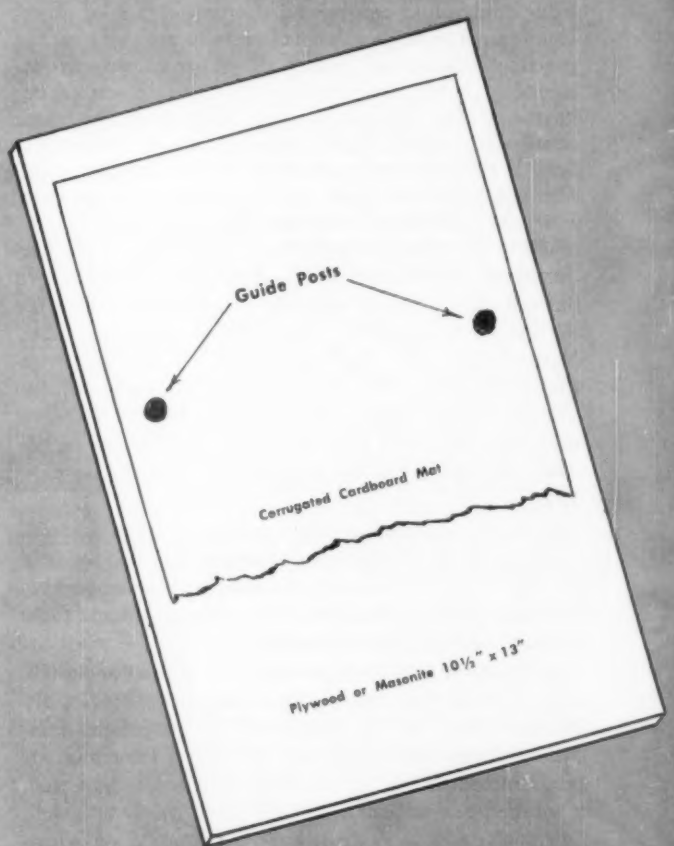
There will still be a need for the essay test, but the use of a self-scoring device will add variety and new possibilities for the learning and testing of factual information.

POSTSCRIPT

Since he first submitted this article some months ago, Dr. Chavez has perfected a new device for giving students immediate knowledge of results. Below is a description.

ANOTHER PROCEDURE similar to the one described on the left would be to use the same answer sheet with a "punch" board. As each student finished the test the instructor would place his answer sheet on the board, making sure of correct placement by inserting the guide holes on the two posts on the board. When all, or a sufficient number of answer sheets were piled on the board, the instructor would punch a hole with an awl or ice pick through each correct answer.

The "punctured" sheet would immediately be returned to the student enabling him to verify his responses by referring to the answer sheet and test booklet.



P. Kenneth Komoski

The Collegiate School Conference

A meeting of educators and programming experts

The author was chairman of the conference sponsored by Carnegie Corporation at Collegiate School last September. This is his report with minor deletions. Mr. Komoski has since been named president of the Center for Programed Instruction at 365 West End Avenue, New York City.

UP TO THIS TIME experimental psychologists have investigated the learning principles and developed most of the materials used in programmed instruction. Educators, while recognizing the importance of establishing such principles, have often been puzzled over the practical educational values of research projects designed to teach laboratory animals certain sets of behavior. It was first necessary to have programs which could demonstrate these practical values before the field of programmed instruction was to merit any serious consideration from the educational community. Fortunately some relatively complete programs in mathematics, psychology, and other subjects have appeared during the last three years, but up to the present there has not been as much material as would be needed for the use of programmed instruction on any large scale. Nevertheless, many more programs, varying greatly in size and quality, are in preparation throughout the country, and educators will soon be faced with decisions regarding the use of these materials. (See report on the newly created center for programmed material on page 151.)

With this in mind, Collegiate School asked a representative group of research psychologists from the field of programmed instruction to confer with a comparable number of interested educators in order to discuss these issues of growing mutual concern.

It was hoped that a report of these discussions might serve as a first step in helping educators to develop intelligent plans for the integration of programmed instruction into elementary and secondary education. If programmed instruction is to be used wisely and well, it will be because educators have acted wisely and well. Obviously, educators must have information on which to base their decisions.

No attempt was made in the conference to discuss formally all of the facets of programmed instruction. Rather, the two days were limited to what were thought to be three general areas of study: communications, research and development, and evaluation.

Communications

At this early stage in the use of programmed instruction, the conferees thought that educators, whether contemplating the use of programmed instruction or not, ought to be aware of the following: First, a good deal of the information on programmed instruction which has appeared in the popular press has been misleading and unreliable. Second, programmed instruction offers an unusual opportunity for curriculum study within a given school system. A program will teach the material it contains and no other. Thus, the adequacies and inadequacies of curriculum goals will quickly become apparent, and there will be an attendant opportunity to emend these goals in the light of research findings.

It was also noted that programmed instruction will make necessary a redefinition of the teacher's role. Teachers will probably be encouraged to render a higher level of professional service. They will be given more responsibility in integrating and intepreting knowledge, something which they can seldom afford to do in the conventional situation.

For those educators who are contemplating classroom use of programmed instruction, the conferees believed that more specific suggestions were necessary. They recommended *Teaching Machines and Programmed Learning* (Lumsdaine and Glaser) as an introduction to the field. However, it was emphasized that at this stage of development, some publications may offer conclusions and predictions without supporting data. While such statements are worthy of consideration, they should be used neither as a basis for determining the role of programmed instruction in particular educational settings, for selecting a particular set of materials, nor for establishing precedents in research or usage. The conferees also recommended that educators not restrict themselves to secondary information, but that they try to learn some unfamiliar subject from programmed materials alone.

It was felt that a variety of programs by different authors would probably provide the broadest basis for comparison and judgment. It was pointed out that small-scale trials of a variety of programs, carried on outside of regular class time if necessary, could easily be arranged in almost any school. The conferees suggested that consultation with researchers and administrators who have already had experience in classroom use of programmed instruction would be a helpful supplement to reading.

The conferees thought that two areas called for ex-

treme caution because of the large number of unknown factors involved. First is the purchase of machines. Since there are many types of machines and a growing number of programs available, "buyer beware" should be the guiding principle. It was emphasized that most machines and programs are, at the present time, "immature" and may not be well suited to the needs of a particular educational system. It was also noted that most trials of programmed instruction and many of the research experiments in this field are currently being conducted with programmed texts. There are several reasons for this: first, machines in sufficient quantity are not available at the present time; second, those machines that are available are, for the most part, mechanically unreliable or lack desired flexibility; and third, at this point, programmed texts are an inexpensive means of presenting programs. Nevertheless, the conferees did not wish to give the impression that machines were a non-essential element of programmed instruction, since certain programs cannot be presented without machines, for instance, those for pre-readers and those that synchronize a sound track with visual materials.

The second area in which the conferees advised caution is the administrative reorganization that the large-scale use of programmed instruction will probably entail. The conferees advised a cautious and gradual adoption of programmed instruction in order to minimize the confusing side effects that often accompany changes of any consequence.

The conferees emphasized strongly that the recommended caution should not be taken to imply inactivity on the part of the educator. Persuaded that programmed instruction may well be one of education's most significant steps, they were unanimous in welcoming further inquiry from educators. They hoped, however, that the various "caveats" would produce an enthusiasm tempered by informed caution.

Research and Development

Research underlies development in any new field. Since schools have made practical application of programmed instruction only during the past few years, the existence of questions and problems with no satisfactory solution is quite apparent. In such a situation, continued research is vital for continued development, and it is hoped that schools that make use of programmed instruction will contribute to this research.

The conferees enumerated three objectives for research that seemed to them of immediate importance. First, research ought to develop a "science of programming," in so far as such a science is feasible. Second, it ought to investigate the relative merits of the various methods of presenting programmed instruction, such as write-in machines, multiple-choice machines, programmed texts, etc. Third, research ought to examine useful ways of combining programmed instruction with other means of teaching. The conferees felt that one result of research might be the creation of generally accepted criteria by which programs could be judged. Such criteria might be best established through the cooperation of research groups, experienced educators, and curriculum study groups.

Another area of concern was school administration. As was mentioned above, the introduction of new methods and material is invariably accompanied by some confusion. The conferees thought that such confusion might be minimized if administrators knew, in advance, the areas that would be potential trouble spots. It was, therefore, suggested that university study groups, teachers colleges, and schools of education begin to investigate the administrative implications of the use of programmed instruction. The conferees also noted that because the use of programmed instruction provides an unusual opportunity for evaluation of curriculum goals, administrators ought not to be deterred by temporary disruptions.

One final area drew the attention of the conferees—the programs themselves. They were concerned about the quality of many programs now being created. Potentially, programming is a science, but it is also an art. Programmers should, therefore, strive to make their programs interesting; that is, the program should be so designed that it maintains the student's desire to learn in addition to insuring his mastery of the specific subject matter. Programmers should also pay careful attention to the ultimate goal of the program, as well as the conceptual idea of the subject matter. While programming has no necessary relationship to modern curriculum developments, it might be helpful to both educational movements if programmers were to take notice of the modern developments in curricula and not to limit their attempts to the more conventional curricula.

Evaluation

The consensus of the conference was that all programs have enough common characteristics to warrant two criteria for judgment: first, the program ought to reflect an adequate and current understanding of the subject matter, and second, it ought to use the techniques of programming to best advantage.

It was suggested that it would always be appropriate to ask whether a given program were more efficient than conventional methods of teaching. Other factors noted by the conferees were achievement, retention, transfer, and future scholastic performance, particularly a student's ability to generalize from the materials of a program. Also mentioned were the teacher's role and the time and cost involved in the programmed instruction itself.

The conferees stressed the fact that at the present time there is no standard means of testing programmed material, and that the results of existing standardized tests will not, in all cases, provide adequate data for any sound judgment. For this reason educators should hold suspect all statements to the effect that "scientific research" has proved such-and-such a program superior; the educator must assume the burden of testing the basis for such statements. But it was noted that the three general criteria listed above (subject matter of the program, programming techniques, and comparative efficiency of the program) could serve as a check on minimal quality. The conferees hoped that eventually criteria could be established to which any program might be subjected. There would thus be a reasonably objective standard at the disposal of educators.

Programming Trends

Edward B. Fry

The information on these pages is based on a research study in progress at the University of Southern California by the author and Joseph W. Rigney. Drs. Fry and Rigney were co-authors with Glenn L. Bryan of the first definitive bibliography on teaching machines, later issued as Supplement 1 of AVCR.

FOR THE PAST SIX MONTHS we have been collecting samples of teaching machine programs from all over the country in order to ascertain the prevalent type styles and subject matter. Most of the programs are of constructed-response type and, with simple format revision, will fit into any constructed-response teaching machine or auto-instructional device. The second largest type of programming, multiple choice, usually requires a different type of machine or device. The third type is the so-called "scrambled book" which requires a special type of machine or page arrangement. Table 1 gives an overview of relative quantity.

TABLE 1

Programs Classified According to Response Format

TYPE	NO. OF PROGRAMS
Constructed response	47
Special constructed response	2
Multiple choice	13
Special multiple choice	2
Scrambled book	6
Tab Test	1
Language Lab	4

It is perhaps somewhat unfair that we did not separate programs according to length as some of them, designed for short experiments or part of a classroom lesson, run only to a few pages while others which are intended to cover an entire semester run to thousands of items. Another problem is to locate all programs in existence. The week does not go by but what we learn of some new and unexpected source. However, as Dr. Gallup might say, we feel that we have a fairly "representative sample," and that some factual information is better than none.

In terms of programming curriculum materials the subject of mathematics is a hands down favorite. This is probably due to the fact that math lends itself to being broken down into small steps; it is also a subject in which questions have exact answers. Our classification of English, which includes reading and spelling, ranks second, which is natural. English is a fundamental of American education. Psychology is in third place, probably because the backbone of the teaching movement to date is composed of psychologists who naturally tend to program the subject with which they are most familiar. Foreign languages and physics rank next. Table 2 shows that we have listed some 16 rather broad categories. It is probably quite safe to say that in the next few years some programs will have been developed for every subject taught in our schools.

TABLE 2

Programs Classified According to Subject Matter

SUBJECT	NO. OF PROGRAMS	SUBJECT	NO. OF PROGRAMS
Anatomy	1	Genetics	2
Auto-Instruction	2	Industrial Arts	1
Bridge	1	Logic	3
Chemistry	3	Mathematics	21
Computers	1	Music	3
Electronics	2	Physics	4
English, Reading, Spelling	12	Psychology	9
Foreign Languages	4	Training	1

Most of the programming to date has been done at the college level, which is not surprising since most of the teaching machine research has taken place in, or has been related to, colleges and universities. It is sometimes difficult to determine a program's level. Is beginning German a college subject, a secondary subject, or a general adult subject? When in doubt we considered the source. As you can see by Table 3, the elementary school has the least programs available; this is probably the area which will grow fastest in the next few years.

TABLE 3

Programs Classified According to Level of Instruction

LEVEL	NO. OF PROGRAMS
Elementary	7
Secondary	11
College	46
Adult	11

In order to give an interesting kaleidoscope of programming underway, the following tongue-in-cheek awards were made at a recent programming conference held at the University of Southern California:

Longest Program in Actual Feet: H. O. Holt, Bell Telephone Labs, "Basic Electricity" (2225 feet)

Highest Sheer Bulk: A. A. Lumsdaine and David Klaus, American Institute for Research, "High School Physics" (approximately three large telephone books, 3000 items)

Most Improbable Subject Matter: Robert Gagne, Princeton, "Quinary Numbers" and Evan Keislar, UCLA, "Molecular Theory for First Graders"

Having Courage Where Commercial Giants Fear to Tread: Lloyd Homme, Teaching Machines, Inc. (seven commercially available programs—Statistics, Russian, Music, etc.)

Showing Psychologists How to Use the Printed Page: Harcourt Brace, "English 2600" programmed text of 2600 items on 440 small attractive pages

Largest College Level Programming Effort Underway: John Barlow, Earlham College (at least seven college courses) and John Blyth, Hamilton College (at least five college courses)

Largest High School Programming Effort Underway: Lewis Eigen, Collegiate School, New York City (28 programmers working)

Largest Elementary Programming Effort Underway: Unfortunately the judges withheld an award due to apparent lack of qualified contenders.

Most Promising Commercial Efforts: Allen Calvin, Hollins College and Encyclopaedia Britannica Films (Mathematics for the entire high school curriculum and two college courses) and Norman Crowder, Western Design and Doubleday (scrambled book programs in special arithmetic, bridge, etc.)

Experimental Programs with Greatest Branching: John Coulson and Harry Silberman, System Development Corporation (computer controlled logic program); Joseph W. Rigney and Donald Schuster, Electronics Personnel Research Group (11 scrambled books on electronics troubleshooting).

Best Known and Tried Out Program (also best suited for students who learn like pigeons): James Holland and B. F. Skinner, "The Analysis of Behavior" (being published by McGraw-Hill)

Programs in Progress

AMERICAN INSTITUTE FOR RESEARCH
Pittsburgh, Pennsylvania
(Available for research use only)
High school physics
(In preparation)
Electronics, atomic theory, geometric theorems, art appreciation

CENTER FOR PROGRAMED INSTRUCTION
365 West End Avenue, New York 24
(Most programs listed are in preparation stage only)
Languages: French spelling for the sixth, seventh, and eighth grades; beginning French; beginning German
Mathematics: A "pre-verbal" program in number concepts and symbolism; elementary school arithmetic; junior high school mathematics; sets, relations, and functions; mathematics for science
English: spelling; critical reading; developmental reading
Science: chemistry, physics, elementary school science

DOUBLEDAY AND COMPANY, INC.
Garden City, New York
(Available in Tutor Text form)
The Arithmetic of Computers, by Norman Crowder
Adventures in Algebra, by Norman Crowder and Grace Martin
The Elements of Bridge, by Charles H. Goren
Introduction to Electronics, by Robert Hughes and Peter Pipe

EARLHAM COLLEGE
Richmond, Indiana
(Programs not commercially available; in various stages of development)
Biology, chemistry, English, mathematics, elementary statistics, genetics, music, psychology, religion, elementary Russian, elementary Spanish

ENCYCLOPAEDIA BRITANNICA FILMS
1150 Wilmette Avenue, Wilmette, Illinois
(In preparation)
Mathematics: first and second year high school algebra, plane geometry, solid geometry, introductory college mathematics (field axiom algebra, college trigonometry, analytical geometry), introductory calculus I and II, intermediate calculus, differential equations
Languages: elementary Latin, two-year high school courses in French I and II, Spanish I and II, German I and II

HAMILTON COLLEGE
Clinton, New York
(Programs not commercially available and in various stages of development)
Elementary French; elementary German; logic and scientific method; analytic geometry and calculus; psychology

HAMILTON RESEARCH ASSOCIATES *
Box 38, New Hartford, New York
Symbolic logic

HARCOURT BRACE AND COMPANY, INC.
730 Third Avenue, New York 17
(Available)
English 2600, programmed text in grammar, junior-senior high school

HARVARD UNIVERSITY *
Cambridge 38, Massachusetts
Elementary arithmetic, second and sixth grade spelling, pre-reading, psychology

INDIANA UNIVERSITY *
Bloomington, Indiana
Russian

MCGRAW-HILL BOOK COMPANY
60 Fifth Avenue, New York 11
(Available Spring 1961)
The Analysis of Behavior: A Program for Self-Iinstruction, by James Holland and B. F. Skinner

NATIONAL TEACHING MACHINES
Box 4016, El Paso, Texas
(Available)
Your Personal Tutor in Algebra

OBERLIN COLLEGE *
Oberlin, Ohio
Psychology, genetics, music theory

OHIO STATE UNIVERSITY *
Columbus 10, Ohio
Educational psychology

SCHERING CORPORATION *
Bloomfield, New Jersey
Algebra, geometry, trigonometry

SMITH-HARRISON, INC.
Box 717, Devon, Pennsylvania
(Available booklets for use with Devereux Teaching Aid, Model 50)
Mathematics: Re-usable booklets on arithmetic vocabulary; addition, subtraction, multiplication, and division combinations; coins and making change; introduction to algebra; addition of three single and two digit numbers; Roman numerals; simple fractions; introduction to fractions
Geography: Our Fifty States, containing a booklet to go on the machine plus a bound set of plates with pictorial or graphic material

TMI-GROLIER
235 San Pedro Dr., N.E., Albuquerque, New Mexico
(Available)
Statistics: descriptive statistics, statistical inference, introductory statistics
Mathematics: fundamentals of algebra, multiplication and division facts
Languages: basic Hebrew reading, basic Russian reading
Other: fundamentals of music, fundamentals of electricity, fundamentals of spelling
(Available June 1961)
Mathematics: elementary arithmetic (decimals, addition and subtraction), algebra
English: vocabulary, usage, punctuation
Languages: Spanish, German, French, Latin
Other: general science, electronics, transistor theory

WESTERN DESIGN & ELECTRONICS, Division of U.S. Industries, Inc.*
Santa Barbara Airport, Goleta, California
Number systems, bridge

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* In preparation, as reported in **Teaching Machines: An Annotated Bibliography,** compiled by Edward Fry, Glenn Bryan, and Joseph Rigney. Published as Vol. 8, No. 2 (Supplement 1) of **AV Communication Review,** 1960. p. 8-9. Other university efforts reported were: University of Arizona (elementary arithmetic); University of California, Los Angeles (elementary science); University of Georgia (algebra); University of Michigan (high school grammar); University of Pittsburgh (number bases); and University of Southern California (electronics troubleshooting and Boolean algebra).

Sources of Self-Instructional Devices

Compiled by Virginia G. Sturwold

LISTED ON THESE PAGES are manufacturers of self-instructional devices and brief descriptions of their products. The descriptive information is listed in this order: (1) stimulus or program designed to elicit a reaction; (2) display by which the program is presented; (3) response panel which the learner uses in forming his responses; and (4) confirming and reinforcement mechanisms which provide the learner with information as to the correctness of his response and the impetus for further operation of the device.

A.H.B. PRODUCTS
6247 Park, Indianapolis, Indiana
Semi-automatic teaching machine: paper roll; learner-paced; constructed; comparison.

APPLIED COMMUNICATIONS SYSTEMS
8535 Warner Drive, Culver City, California
35mm slides plus tape; machine-paced; constructed; comparison.

ASTRA CORPORATION
31 Church Street, New London, Connecticut
Autoscore: paper sheets; learner-paced; multiple choice; machine proceeds to next question if correct answer is given, error counter goes up, machine does not proceed if wrong answer is given.

COMPARATOR
P. O. Box 452, Petaluma, California
Comparator (arithmetic teaching machine): paper strips; learner-paced; sliding indicators; comparison.

CORRIGAN AND ASSOCIATES, INC.
8701 Adah Street, Garden Grove, California
Teletest Communications System: films, slides, videotape, blackboard; group-paced; multiple choice and/or response construction; feedback by red or green lights, comparison, response construction, and branching programming methods.
Telepacer: filmstrips, slides; learner-paced; multiple choice; comparison, visual feedback by red and green lights.
Telescriber: electronic write-in tablet for use with the Teletest and the Telepacer.
Telecounter: small mobile computer processing student IBM cards for individual evaluation; plus item analysis capability for program evaluation for groups of individual learning items.

DYNA SLIDE COMPANY
600 South Michigan Avenue, Chicago 5
Vertimask and *Slide-a-mask:* paper sheets; learner-paced; constructed; comparison.

EDUCATION ENGINEER ASSOCIATES
3810 Pacific Coast Highway, Torrance, California
Speed Teaching Machine: slides; learner-paced; matching or multiple choice; response changes stimulus.

EDUCATIONAL TELEVISION AIDS
111 Hampton Road West, Williamsport, Maryland
3000 feet of paper; teacher-paced; written or verbal; comparison.

FORINGER AND COMPANY, INC.
312 Maple Drive, Rockville, Maryland
Foringer #2002: paper sheets; learner-paced; constructed on separate tape; comparison.
Foringer #1224: projected image-groups; learner- or time-paced; multiple choice; response changes stimulus.
Osler-Foringer #1231: filmstrip; learner-paced; two-choice discrimination; any response changes stimulus.

GENERAL ATRONICS CORPORATION
Bala-Cynwyd, Pennsylvania
Atronic Tutor: special booklet; learner-paced; multiple choice using notched cards; automatic page turning.
Atronic TAG (teaching and grading): paper booklet; learner-paced; multiple choice and write-in; penetration of stylus.

HAMILTON RESEARCH ASSOCIATES, INC.
Box 38, New Hartford, New York
Visitutor Card Model #200: 4x6 cards in magazine; learner-paced; constructed; comparison.
Visitutor: microfilm aperture cards; learner-paced; constructed; comparison.
Auditutor: cartridge (tape indexed in segments); learner-paced; constructed; feedback through earphones or speaker; comparison.
Combination Audio-Visual: synchronized Visitutor and Auditutor; learner-paced; constructed; comparison.

HUGHES AIRCRAFT COMPANY, INDUSTRIAL SYSTEMS DIVISION
P.O. Box 90904, Los Angeles 45, California
Videosonic Teaching Machine, Research Model: aural-visual (electro-optical); learner- and machine-paced; multiple choice, written and oral completion (instantaneous and delayed); aural or visual, automatic and manual scoring.
Videosonic Teaching Machine, Student Model: each one of seven in series combines various combinations of multiple choice, written completion, and oral completion.

HRB-SINGER, INC.
Science Park, State College, Pennsylvania
Star: printed circuit board; learner-paced; multiple choice, true-false; signal light.

INSTRUMENT RESEARCH COMPANY
Garden Grove, California
Multiple Choice Card: 3x5 cards; learner-paced; multiple choice; green light.
Punchboard: punchboard; learner-paced; multiple choice; feedback.

KONCEPT-O-GRAPH
179 Berkeley Street, Rochester 7, New York
KOG 7: printed sheets; student operated; constructed; comparison.

LANGUA-LAB, INC.
167 Chestnut Street, Albany 10, New York
Langua-Learner: magnetic tape cartridge (or synchronized 35mm filmstrip); learner-paced; constructed with "re-response" after further stimulus is wrong; comparison, correct choice changes stimulus.

MANAGEMENT RESEARCH ASSOCIATES
14 Hill Drive, Dune Acres, Chesterton, Indiana
Multiple-Purpose Self Trainer: manual adapts Self Trainer to lectures, films, reading material, etc.; learner-paced power group test; multiple choice pull tab overlay; feedback.

PICTURE RECORDING COMPANY
1395 W. Wisconsin Avenue, Oconomowoc, Wisconsin
Model TR-1655: 35mm slides and recorded tape; machine- and/or learner-paced; continuous commentary; feedback.

PROGRAMMED TEACHING AIDS, INC.
3810 South Four Mile Run Drive, Arlington 6, Virginia
Ferster Tutor #2010: paper tapes; learner-paced; constructed on separate tape; comparison.
Foringer Aural-Visual Tutor #2002: simultaneous paper and repetitive magnetic tape; learner-paced; constructed, written and oral; comparison.

RECORDAK CORPORATION
415 Madison Avenue, New York 17
Mentor: unitized 16mm microfilm; learner-paced, variable program format; multiple choice and/or constructed; comparison.

RHEEM CALIFONE CORPORATION
1020 North La Brea, Hollywood 38, California
Didak 101 Pre-Verbal Machine: paper fold; learner-paced; multiple choice; correct choice changes stimulus.

Didak 501 Simple Recall Machine: paper sheets; learner-paced; constructed; comparison.
Didak 601 Multiple-Choice Machine: paper sheets; learner-paced; multiple choice; correct choice changes stimulus.
Didak 1001 Psychomotor Skill Trainer: key punch, typewriter, adding machine; learner-paced; keyboard; correct choice changes stimulus.

SCIENCE RESEARCH ASSOCIATES, INC.
259 E. Erie Street, Chicago 11
SRA Spelling Laboratory IIIa (programmed learning material): "learning wheels" (cardboard assemblies); multilevel, learner-paced; constructed; immediate feedback, branching, level check tests.

SMITH-HARRISON, INC.
Box 717, Devon, Pennsylvania
Devereux Teaching Aid, Model 15: 5x8 cards; teacher-paced; multiple choice; buzzer.
Devereux Teaching Aid, Model 50: bound workbooks; teacher-selected, student-paced; multiple choice; light or buzzer.
Devereux Teaching Aid, Model 80: paper cards; teacher-selected, learner-paced; matching; buzzer or green light for correct, red light for incorrect.
Devereux Teaching Aid, Model 90 (multiplication tables): printed on device; learner-paced; constructed by setting dials; buzzer or light.

TMI-GROLIER
235 San Pedro Dr., N.E., Albuquerque, New Mexico
Min/Max Machine: 8½x11 sheets; learner-paced; constructed; comparison.
Programmed Textbooks: programmed texts; learner-paced; constructed; comparison.
Wyckoff Film Tutor: microfilm; learner-paced; keyboard input; evaluates and feeds back.

THOMPSON RAMO WOOLDRIDGE, EDUCATIONAL ELECTRONICS DIVISION
532 Sylvan Avenue, Englewood Cliff, New Jersey
Mentor: 35mm and magnetic tape; learner-paced; multiple choice keyboard; explains mistakes, branches to new stimulus.

U. S. NAVAL TRAINING DEVICE CENTER
Port Washington, Long Island, New York
Multiple Sensory Stimulation Trainer: desk-like console; learner-paced; pushbutton; comparison.
Tester-Rater, Self-Tutoring Punchboard Device 20E2e: punchboard; learner- and instructor-paced; multiple choice; comparison.

VAN VALKENBURGH, NOOGER & NEVILLE, INC.
15 Maiden Lane, New York 38
Troubleshooting Trainer-Tester (R) Equipment Simulators (Series 1A, 2A, 3A, 4A, 5A, 6A, 10A, 11A): specially printed paper devices; learner-paced; erasing cheat-proof opaque ink reveals problem data or instructional response; comparison and instructional response.
Self-Scoring Trainer-Tester (R) Answer Sheet (Series Z3a, b, c, d); used with any series of four-choice questions; learner- or instructor-paced; erasing cheat-proof opaque ink reveals answer response; instructional response.

VIEWLEX, INC.
35-01 Queens Boulevard, Long Island City, New York
Filmstrip and 2x2 slides; learner-paced; multiple choice; evaluates, corrects, and explains mistakes.

WESTERN DESIGN & ELECTRONICS, DIVISION OF U. S. INDUSTRIES, INC.
Santa Barbara Airport, Goleta, California
AutoTutor, Mark I: 35mm microfilm (stills and movie); learner-paced; full random access multiple choice keyboard; explains mistakes, branches to new stimulus.
AutoTutor, Mark II: 35mm microfilm (stills only); learner-paced; semi-random access multiple choice keyboard; explains mistakes, branches to new stimulus.
TutorText: scrambled book form; learner-paced; multiple choice, turns pages; explains mistakes, branches to new stimulus.

WILLIAMS RESEARCH CORPORATION
P. O. Box 95, Walled Lake, Michigan
Science Desk: sound motion pictures; learner-paced; multiple choice; correct response indicated by flashing light.

Sources of Information

IN ADDITION to Mr. Henry's references listed below (which cite the two DAVI publications *Teaching Machines and Programmed Learning* and the Fry bibliography), the reader is directed to:

- Recent writings on programming, page 151.
- A color filmstrip produced by William Allen (see advertisement on page 163).
- A 16mm film, *One Step at a Time*, to be completed this spring by the American Institute for Research. A half-hour film reporting on auto-instructional methods and their utilization, *One Step at a Time* will present findings from Title VII studies carried on at the Institute. Write to the Library, American Institute for Research, 410 Amberson Avenue, Pittsburgh 2.

References for Henry article (see page 126)

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Learning About Self-Instruction

Jerrold E. Kemp

Bay Section Sponsors Thoroughly "Programmed" Workshop

PROGRAMS WORKED

Linear Type

Branching Type

HOW WOULD YOU ACQUAINT an audiovisual group with programming techniques used in the preparation of self-instructional materials?

Here is a visualized report of how the Bay Section of the California audiovisual association managed it at their January meeting at San Jose State College. Pre-registrants (who at a previous meeting had been initiated into the subject by Sidney Eboch, coordinator of utilization services for the San Jose Center and Robert Mager, research psychologist with Varian Associates, Palo Alto) were further oriented when they received their conference invitations in the form of a 14-page "programmed text"—branching type.

The purpose of the meeting was twofold: (1) to become familiar with two methods of programming and (2) to develop some criteria for evaluating prepared materials.

The planning committee decided to make the occasion a practical workshop in which the participants would have the experience of actually working with programmed materials. Since it was to take place at San Jose State College, the meeting would use the closed-circuit television facilities of the Division of Audiovisual Services to attain flexibility in grouping and at the same time take care of the large attendance expected.

Nearly 200 audiovisual directors, college and school people, and NAVA representatives were on hand for the carefully "programmed" day of: (1) individual work with examples of linear and branching programs; (2) televised introductions to basic concepts in the two types of programs; (3) individual analysis of specially constructed programs containing deliberate errors to illustrate criteria; (4) small group discussions; and (5) questions by direct phone to the TV studio with answers over TV by either Sid Eboch or Bob Mager; and (6) a "quiz-type" summary to test what had been learned.

Was it a success? Judge for yourself. Here is a visualized report. . . .

Dr. Kemp is coordinator of materials preparation services for the audiovisual service center at San Jose. The pictures are by Gayle Smalley, photographer for the center.

January 7, 1961

SELF-INSTRUCTIONAL PROGRAM

Schedule

Programming Today's Programs
Division into Work Groups

Assigned Room --

Work Session #1: Sampling Two Forms of Programmed Materials

Orientation (via closed circuit TV): Linear Types of Programs

Work Session #2: Study of Linear Type Programs

Discussions and Questions on Linear Type Materials

Lunch

Assigned Room --

Return to Work Groups
Orientation (via TV): Branching Types of Programs

Work Session #3: Study of Branching Type Programs

Discussion and Questions on Branching Type Programs

Summary of Program

Association Business Announcements

Programming—The Tutorial Approach

(Continued from page 132)

instruction will vastly improve the student's speed of learning or level of attainment.

The second level is that of conceptual learning and involves material in such subjects as physics, statistics, and economics. Here, the student not only must learn specific facts, but he must be capable of handling a much wider variety of problems and examples than can be specifically covered by the program. The results of our physics study illustrate the kinds of gains that can be achieved in this area.

The third level of instruction involves the teaching of such capabilities as creative thinking and judgment. This may be the level of education at which auto-instruction will yield its greatest fruits. The possibilities of developing a program in this area are derived from two simple observations. First, we have sufficient data to indicate that creativity and judgment are examples of learned behavior. Secondly, we have evidence to indicate that these behaviors can be taught. What is left is simply a problem of mechanics, that is, identifying exactly those behaviors to be learned and then finding the means to successfully establish these behaviors in the student's repertoire with auto-instructional methods and devices.

To be more specific, research is now in progress to extend the range of auto-instructional applications to areas which will not only expand a student's knowledge of facts but will further his understanding and inventiveness as well. At the American Institute for Research, again with the support of the U. S. Office of Education, we are currently engaged in preparing materials of this sort which we expect to evaluate sometime this spring. The first course will provide basic laboratory instruction in electronics, and will involve the use of actual laboratory equipment. The second will instruct advanced students in the principles of college-level atomic theory. The third course now being prepared is an attempt to instill the insights necessary for students to solve geometric theorems which they have never before seen. The fourth course will provide instruction in art appreciation and, while this course will include some information on art history and principles, its major purpose is to develop a feeling of appreciation for art and the ability to differentiate between good and inferior art.

In conclusion, our experience with the use of auto-instructional materials in the classroom has provided us with concrete evidence as to the potentialities of this approach for education. We must be cautious, however, and temper our enthusiasm for the technique until it has been more thoroughly tested and understood; and, as I noted above, we must be careful in our development and use of programmed materials so as to not only capitalize on our knowledge of human learning and education, but on our knowledge of human learning and behavior as well.

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to teach a full year of **FRENCH** *in the elementary grades*

EN CLASSE

Coronet Films now makes available an unusual new program, EN CLASSE. With sound on records, this course enables teachers with limited language training to teach a full year of conversational French, especially in grades three, four, and five. The program has supplementary use in junior and senior high schools . . . even in schools which already have an established language program. EN CLASSE was developed under the direction of Roger A. Pillet, Ph.D., Assistant Professor of Education in French, The University of Chicago.

Combining 20 appealing filmstrips in full color with sound on 12" LP records, EN CLASSE encourages maximum pupil participation—the best way for youngsters to learn a foreign language. It develops an extremely wide range of conversation on such subjects as greetings, numbers, songs, colors, days of the week, telling time, parts of the body and many others.

Each EN CLASSE filmstrip unit is designed as the basis for two weeks of planned instruction—a full year of regular, intensive teaching. A 64 page Teacher's Manual accompanies the course—an authoritative guide to the most effective use of the program.

***Use the coupon** . . . to order EN CLASSE at the full price of $195 with a fifteen-day examination privilege or to request full descriptive information.*

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Coronet Building, Chicago 1, Illinois

☐ Please send EN CLASSE on fifteen-day approval. It is understood that if the program is not entirely satisfactory, it may be returned for full credit of the purchase price.

☐ Please send descriptive brochure on EN CLASSE.

Name_____ Position_____

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introducing **FERSTER TUTOR**

the new booksize teaching machine

A PERSONAL TUTOR FOR PROGRAM TAPE PRESENTATION

BOOKSIZE yet big enough to store program tapes for an entire course.

BOOKPRICED so that each student can have his own program device for every course. It's no longer necessary to use scrambled texts.

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FERSTER TUTOR permits each student to proceed at his own pace and to keep his own tape until the program is completed. Program tapes may be used over and over again.

Developed by the Foringer Teaching Machine Staff, **FERSTER TUTOR** has the versatility and the easy-to-operate features of the Foringer Teaching Machine.

Tested and approved by Education Design, Inc.

PTA*

*T.M. PENDING

for full information write to:

PROGRAMMED TEACHING AIDS, INC.

3810 S. Four Mile Run Drive, Arlington, Virginia

Prepared by Kenneth L. Nathanson Associates

First Reports
On Roanoke Math Materials

FIRST REPORTS are now coming out of Roanoke where the Britannica Center for Studies in Learning and Motivation has been carrying on an experiment with programmed materials in mathematics.

Based on B. F. Skinner's principles of programming, these materials were developed last summer by top mathematicians from Harvard, Yale, MIT, and Columbia who worked under the supervision of Allen Calvin, director of the Britannica Center. [The Center, which plans to continue and expand its operations, is now in the process of relocating at Palo Alto, according to Dr. Calvin who appeared before several NEA audiences last month.]

The courses programmed by the Britannica Center last summer were: First-Year Algebra; Plane Geometry; Second-Year Algebra; Trigonometry; Solid Geometry; the Languages of Algebra—Fields and Ordered Fields; Introductory Calculus; Intermediate Calculus; and Differential Equations. First reports out of Roanoke are confined largely to geometry, algebra, and trigonometry.

While all of the programs had been tested with students during construction, the staff at the Britannica Center thought a large-scale field study desirable before releasing the materials commercially. In Roanoke—one of several testing areas selected throughout the country—all three high schools participated with approximately 900 students involved. The teacher selected for each experimental course was given three classes—one to be taught in conventional fashion (except that students were told they would be part of the experiment); the second using the experimental material with no help from the teacher except to discuss results of periodic examinations; and the third, using the programmed material with help from the teacher. Students in the experimental classes were not permitted to do homework, while the conventional classes were allowed to proceed in usual fashion.

Since each student in the programmed course is permitted to proceed at his own pace, wide variations have already been detected in the speed with which they progress. A few children had finished a full year's work by December while others were not even moving at the speed of a normal conventional class. It appeared that Track A of one geometry class would be completely finished by March while some of the students in a Track B Class would require study-hall time to complete identical material by June. The programmers feel however that when experimental constraints are removed to permit children to take material home, the average child in the Roanoke public school system will be able to complete two years' work in one.

Here is a table of failure percentages to give some indication of the effectiveness of programmed material in the Roanoke experiment. The programmers stress that these are very early results and should be judged in that light.

PERCENTAGE OF FAILURES

	HIGH SCHOOL		
	A	B	C
Geometry			
help classes	6%	7%	6%
no-help	8%	0%	0%
traditional	15%	8%	0%
Algebra			
help classes	21%	25%	4%
no-help	20%	29%	3%
traditional	23%	9%*	11%
Trigonometry			
help classes	10%	0%	——
no-help	4%	0%	——
traditional	18%	7%	——

*Only case in which percent of failures did not correspond to available test scores on the national standardized examination.

Scores on the national standardized tests are necessarily fragmented in this first report since few standardized tests had been given at midterm. However, the report does release data on the percentage of students who fell in the "very low" category on standardized tests in algebra and geometry. (The very low category, as designated by the test authors, are those students who fall below the 8th percentile.) Of all geometry and algebra students in the "help" and "no help" classes combined, 5 percent fell in the very low category as compared with 12 percent of students in the conventional classes. (The Roanoke study notes that "help" and "no help" groups surpassed one another with equal frequency, leading to the conclusion that there is no perceptible advantage in having teachers repeat material already in the program.)

Picture May Change

Expounding on the Roanoke report before an NEA audience, Dr. Calvin stressed repeatedly that the Britannica Center regards its findings thus far as extremely tenuous. Among factors not yet properly assessed are the "novelty factor," the fact that students have not been permitted to take material home, teachers' biases, amount of help at home, etc. One teacher, Dr. Calvin said, failed 30 percent of a programmed class — a record which gave evidence of teacher hostility. For the most part, Roanoke teachers like the programmed courses. Discipline problems are mitigated, they report, and with routine questions eliminated by the programming, teachers can concentrate on the important ones. Programming gives them more opportunity for work with individual students.

Attitudes among students run pretty much to form: Few students would reject programmed courses outright, and equally few would vote to have all their courses programmed. The biggest percentage of students would like to see from two or three to half of their courses in program form.

When asked for improvement suggestions, a majority of students in both the "help" and "no help" classes indicated they would like to be permitted to work on the programmed material outside of class hours and that they would prefer to have the courses supplemented by occasional lectures.

Dr. Calvin told his NEA audiences that he does not think classroom teachers are qualified to program their courses. The value of a programmed course, he said, lies in its superior content—it should be the best that money can buy. That is why the

Britannica Center has engaged only top subject-matter experts for their courses. Teachers should be called in to work with the psychologists on programming projects, but should not do the actual programming.

To the perennial question—will the programmed text replace the teacher—Dr. Calvin said no.

"If you're only interested in training a technician," he said, "then the program without the teacher is okay. But if you want your students to be mathematics oriented, then you need teachers."

Dr. Calvin personally feels that programmed material is every bit as effective without the machine, but at the same time believes that machines are inevitable. For one thing, sheer bulk of the programmed materials may require that they be put on microfilm. (A course in algebra programmed on paper will stack up as high as one foot.)

To the question—what are the implications of programmed instruction for teacher education—Dr. Calvin answered simply that teachers colleges will have to teach more subject matter. "The day is gone," he said, "when the basketball coach can pinch hit as math teacher."—A. F.

Center for Programed Instruction

SOME INDICATION of the growing significance of teaching machines and programmed instruction is found in the establishment of the Center for Programed Instruction in New York City. The Center is an outgrowth of the Collegiate School project which since 1959 has concerned itself with programming and the use of programmed instruction.

Kenneth Komoski who directed the activities at Collegiate School will head the new Center with a staff of teachers, administrators, psychologists, and experienced researchers who will devote full time to continuing the work of the project and extending it to schools throughout the country.

Center spokesmen say they think that perhaps the most significant aspect of their work is the fact that a research program has been initiated at the school level which is committed to a radical examination of both the learning and teaching processes. Their stated purpose is to "effectively translate research findings into classroom application."

More specifically, the Center proposes to serve the educational community by:

- Consulting with and helping schools interested in carrying on projects in the fields of programmed instruction and teaching machines.
- Creating thoroughly tested programs of instruction in all subjects. (See page 143 for programs in progress.)
- Conducting controlled research to investigate programming variables and administrative techniques of implementing programmed instruction.
- Supplying experimental programmed learning materials to schools interested in conducting trials of such materials.
- Disseminating objective information about programmed instruction and teaching machines. It is the object of the Center to make it possible for all educators to obtain the information and evidence they need if they are to make intelligent judgments regarding the use of programmed instruction and teaching machines.
- Conducting in-service workshops in cooperation with school systems, teachers colleges, and universities.

The Center will conduct four major research projects in 1960-61 to investigate retention, response variables, and reinforcement schedules. Other trials and studies of programs created at the Center will be carried on in cooperation with these school systems: New York City (junior high school division); Denver; Newton, Massachusetts; Evanston, Illinois; Hanover, New Hampshire; and Ulster County, New York. Many other studies will be carried on in individual public and private schools throughout the country.

[The Center reports that results of a Collegiate School study seem to indicate that write-in machines and programmed texts are equivalent as methods of presenting material. Details of this experiment are given in *Research Summary #1* (see references further down). Other results of this same study indicated that it may be advisable for educators to re-examine completely the course content of different grade levels. (The reasoning is that since most curriculum decisions are based on traditional methods of teaching, the use of programmed instruction opens a host of possibilities in terms of curriculum organization.)]

Inservice workshops are planned for the State College of Education at Providence, Rhode Island; the University of South Florida, Tampa; the University of Chicago; the Harley School at Rochester, New York; Teachers College, Columbia University; and at the Center, itself. These two- and three-week workshops will offer a general orientation to the field of programmed instruction as well as specific training in programming.

Publications currently available from the Center include:

Research Summary Number 1 by Lewis D. Eigen and P. Kenneth Komoski, 50 cents per copy (in quantities of 10 or more, 30 cents per copy).

The Construction of Frames of an Automated Teaching Program, by Lewis D. Eigen, 30 cents per copy (10 or more copies, 20 cents per copy).

"Teaching Machines Can Aid the Schools to Make Better Use of Teacher's Time," by Lewis D. Eigen and P. Kenneth Komoski. Reprinted from the *California Journal of Secondary Education*, April 1960.

Sets, Relations, and Functions, Books I, II, III. A programmed text by Lewis D. Eigen, $5.

A Programed Primer on Programing, by Susan Meyer Markle, Lewis D. Eigen, and P. Kenneth Komoski, 25 p. $1; more than 10 copies, 50 cents.

(Experimental copies of revised units of programs will be available in programmed text form in physics, chemistry, and spelling by September 1961. The Center has also announced that it will soon publish a regular newsletter.)

The Center for Programed Instruction is a non-profit, educational organization incorporated under the laws of the state of New York. Directors and members of the Corporation are: Carl Andrews, chairman; Lewis D. Eigen, vice president; P. Kenneth Komoski, president; Daniel J. Leahy, treasurer; Susan Meyer Markle; James McClellan; and B. F. Skinner.

The Center, like the Collegiate School Project, is financed by funds from the Carnegie Corporation and the Fund for the Advancement of Education. For further information about its activities, write the Center at 365 West End Avenue, New York 24.

Teaching Machine Terms: A Glossary

Desmond L. Cook

IN COMPILING THIS GLOSSARY, the author drew from several sources in addition to his own experience and acquaintance with the area of "teaching machines." The primary references were Eugene Galanter, *Automatic Teaching: The State of the Art* (John Wiley, 1959); William Carr, *Self-Instructional Devices: A Review of Current Concepts,* Wright Air Development Center, Technical Report 59-503, August 1959; and Edward Fry, Glenn Bryan, and Joseph Rigney, "Teaching Machines: An Annotated Bibliography," *AV Communication Review,* Vol. 8, No. 2 (Supplement 1), 1960.

Unpublished papers and reports, personal correspondence, and comments received on the first draft from persons actively engaged in research in the area were also utilized. Some terms were secured from a similar draft glossary prepared by Charles Darby, Department of Psychology, Purdue University.

Comment relative to the inclusion of terms not presented or to the clarification of the definitions herein will be welcomed by Dr. Cook, who is associate professor of educational psychology at Purdue.

Augmenting. One way in which guidance through a program is created is by augmenting, or introducing bits of information that will lead the student into a new concept.

Auto-instructional methods. A comprehensive term suggested by Lumsdaine and Klaus to describe instruction characterized by the controlled presentation of material, the elicitation of appropriate response, guidance with respect to the subject matter, and control of the way in which learning proceeds.

Automated instruction. Instructional methods considered generally to comprehend any means, devices or material, whereby teacher or tutor functions (actual or desirable) are replaced, or provided, by a wholly or partially automated sequence of instructional segments that is prepared in advance and is capable of instructing effectively when presented without direct intervention or modification by a teacher. Also called "automatic teaching."

Automatic teaching. See "automated instruction."

Automatic tutoring. An individual instructorless method of teaching which is an automation of the classical process of individual tutoring.

Choice. Refers to the selection of an answer from several alternatives presented to the subject as opposed to having the subject construct or write out an answer.

Construction. The process of requiring the subject to write out or prepare an answer as opposed to choosing one of several alternative answers.

Confirming mechanism. A device or means by which the student has his response confirmed as being right or wrong. Correctness or error can be indicated through the presentation of visual or auditory signals, or, in the case of constructive answers, the presentation of the correct or model answers.

Conversational chaining. A term introduced by Barlow to describe a program wherein the movement from item to item follows less the question-answer pairs in other programs and more the natural train of conversation so that the lesson becomes the main unit of concern for the student rather than the item.

Cue, vanishing. A prompt presented originally, but gradually reduced or eliminated, thereby requiring the student to provide the responses independently.

Display mechanism. The mechanical means by which the programmed set of materials is presented visually or aurally to the subject.

Error. An incorrect or non-appropriate answer to a specific item in the program.

Error rate. Refers to the number or percentage of a given group of subjects incorrectly responding to a specific item on the program. A high degree of error would probably indicate a need for revision in the program.

Fading. The gradual withdrawal of stimulus support in presenting items.

Feedback. Communicating to the subject pursuing a sequence of programmed materials the information needed to modify responses so that failures or errors can be eliminated and correct responses maintained.

Frame. A single item or statement is exposed at a time. The exposed material constitutes a single frame.

Frame, forced. A stimulus frame presented to the student forcing him to respond correctly by obvious nature of the answer.

Frame, response. That part of a teaching machine or programmed textbook which permits the subject to record his response to the item presented by means of the stimulus frame. (See stimulus frame)

Frame, stimulus. That part of a mechanical teaching machine or programmed textbook containing the individual items, in the form of a question or statement, to which the student is to respond. Also refers to the mechanical part of the teaching machine which allows the examinee to see the item.

Hints. Devices used to direct the students' behavior in the desired direction. Used to increase the likelihood of a correct response.

Item, augmenting. An item supplying new information but not requiring the student to make a relevant response.

Item, delayed review. An item which allows for the distribution of practice. Differs from other items only in terms of presentation.

Item, dovetailing. An item requiring the student to make separate responses to separate stimuli which otherwise may become confused.

Item, fading. An item requiring the student to review what has been presented. In addition the item withdraws information successively. Similar to Skinner's "vanishing technique."

Item, generalizing. An item presenting a verbal statement pointing to a common characteristic of several specific problems already presented to the subject.

Item, interlocking. An item that requires a student to review the established skills while new information is being presented.

Item, lead in. An item not requiring new information or rehearsal of old skills but functions to orient the subject to a problem and prepare him for new information.

Item, restated review. An item requiring a rehearsal of the skill where a problem is restated.

Item, rote review. An item presenting a problem identical to one presented earlier.

Item, specifying. An item which exemplifies a general rule or principle.

Item, subject matter. An item classified with respect to its subject matter content.

Item, tab. A specialized term referring to having the subject pull a tab to indicate his response rather than writing out an answer or selecting a choice.

Leading. The student is first asked to talk about familiar things using his everyday vocabulary. He is then led to discuss relations among these. Technical terms are then slowly inserted.

Learning machine. A term often applied to teaching machines. An inappropriate term for describing a mechanical teaching device since it implies that a machine learns.

Matching. Procedure used in some Skinner machines to inform student of correctness of his response. After writing his response, the student moves a lever which exposes the correct answer with which the student compares or "matches" his response.

Operant behavior. Behavior which operates or acts upon the environment. A fundamental concept in Skinnerian learning theory.

Pace. The rate at which the subject is permitted to work through the programmed material.

Pacing, controlled rate. Control of the subjects' rate of responding by features of the mechanical device utilized to present the program.

Pacing, self. The rate at which the subject might complete the material at his own rate depending upon success on the previous steps.

Panel. A short passage of prose material, graphs, and similar material which are presented or studied along with the discs in the Skinner device.

Paper teaching machine. Refers to the "scrambled" or "programmed" textbook type of self-instructional devices.

Porter device. A device similar to the Skinner disc machine, except instead of using round discs, a regular sheet of paper is inserted into the mechanism. The paper contains the programmed material and spaces for insertion of answers.

Pressey device. The earliest known device (1926) originally developed for use with multiple choice tests. Device could be set so that items missed could be skipped or repeated until success was established, a raw score obtained, and an item analysis or error count secured.

Program. The subject matter that is to be learned by the student via the machine or other device.

Programmed book. A special book in which the subject matter to be learned has been arranged into a series of sequential steps leading from familiar concepts to new materials. Differs from a "scrambled textbook" in that the content is arranged so that the student proceeds directly from one step to the next, or one succeeding page to the next, rather than skipping around. The student generally is asked to construct a response as opposed to choice.

Programmed learning. A term sometimes used synonymously to refer to the broader concept of "auto-instructional methods."

Programmer. Generally, a curriculum specialist who subdivides the material to be learned into the sequential steps for later use with the mechanical method of presenting the program.

Programming. The process of arranging the material to be learned into a series of sequential steps; usually moves the student from a familiar background into a complex and new set of concepts, principles, and understandings.

Programming, intrinsic. A method of programming materials that directs the erring subject along certain corrective pathways before he is permitted to proceed to the next step in the program. Requires that each step contain multiple choice answers.

Prompt. Some type of verbal or symbolic cue which facilitates the desired response from the subject.

Prompting. The method or sequence of providing verbal and symbolic cues to encourage responses. Can be visual, verbal, symbolic, or auditory.

Reinforcement, immediate. The process of providing the subject with immediate feedback or information regarding the success or failure of his performance.

Reinforcement mechanism. Some type of reward for responding correctly to the items in the display. A motivational factor causing the individual to keep working at the set of materials. Sometimes considered as an integral part of the confirming mechanism.

Reinforcer, immediate. A self-instructional aid which contains a built-in system of providing the student with immediate knowledge of the success or failure of his performance.

Response device. A type of teaching aid which permits the student to practice certain types of responses. No stimulus is presented as part of this type of device.

Response mechanism. A device which permits the student to record his response to the items presented in the display mechanism. Usually is either the selection of one of several choices or writing an answer to the item in the program.

Response mode. The form of the response a student makes while working on a program.

Scrambled book. A special book containing material to be learned in programmed sequential form, but in which the student is directed to different pages not necessarily in consecutive order. By means of alternate choice responses at each step, branching to new or review material is made possible.

Self-instructional device. A mechanical or paper device which presents a set of planned sequential materials to be learned and which the student can complete in the absence of a live instructor and at his own rate of speed.

Shaping. The building of a behavior or set of behaviors through the differential reinforcement of progressively more adequate forms of behavior. (Skinner)

Skinner device. A mechanical device which presents a set of programmed materials. At each step the subject must construct an answer and evaluate its correctness with a model answer before proceeding further in the program. Generally considered the forerunner of later model "teaching machines."

Skinner disc. A round, flat, record-like device which contains a set or series of program materials for the Skinner device. Contains the questions to be answered, spaces for recording student's answers and the correct response, as well as for making a record of successful or unsuccessful performance.

Step. The increment in subject matter level to be learned with each succeeding item or frame in the program.

Step size. The amount of increase in subject matter difficulty with each step in the program. A large step size could result in relatively few frames while a low step would indicate a relatively large number of frames in the program.

Stimulus device. A type of teaching aid which presents materials to the subject through one or several of the various senses. No active response is required on the part of the subject during the presentation of the materials.

Stimulus-response device. A teaching aid which not only presents material to the subject through any or several of the various senses, but also requires a response to the stimulus presented in order to progress further in the program of instruction.

Terminal behavior. The behavior a program is designed to produce.

Track, multiple. A provision within the programmed material for allowing subjects to pursue alternative subdivisions of the program in terms of their successes or failures with earlier sections of the sequence.

Track, single. A common set of programmed materials which all subjects work through, there being no alternative program such as in the multiple track situation.

Vanishing. The basic problem here is to evoke a given bit of behavior, at least once, in the presence of an appropriate stimulus, so that it can be reinforced. One solution is to begin with stimuli which already control the behavior and to reduce them slowly as learning proceeds.

Dear Mickey:
I have a question about Convention

Dear Mickey:

I am the Keynote Speaker at the Miami DAVI Convention in April, and since I come from a cold climate, I wonder if I need to get out my summer clothes for Florida? Sincerely yours,

CONCERNED

Dear Concerned:

You certainly will. Men seldom wear dark business suits or hats in Miami Beach. Tropical worsted suits or sport jackets, slacks, and short sleeved shirts are standard resort wear. Better bring your raincoat, just in case!

Dear Mickey:

We have been offered a Modified American Plan—breakfast and dinner—for $3 per person per day at the Deauville Hotel during the DAVI Convention. Would you recommend this? I am a big eater—always hungry. Explain to me, please, how this works. Yours truly.

FATSO

Dear Fatso:

I highly recommend the Modified American Plan. You will have your choice of the menu, except for steak (which I believe is an extra $1.50). Dinner, served from 5 to 9 p.m. in the lovely Richelieu Room, includes an appetizer, soup, entree, dessert, and beverage. Breakfast is served from 7:30 a.m. to noon in the Cafe de la Mer, your choice of fruit, hot or cold cereal, eggs or omelet, with bacon, ham, or sausage; assorted sweet or plain rolls, jelly, and beverage.

You may want to grab a glass of orange juice, coffee, and a roll before the meetings, and then eat a full breakfast between 11 a.m. and 12 noon in place of lunch. If you do, you must pay cash for the light breakfast. If you sign for your light breakfast it will count as your breakfast on the Modified American Plan, and then, when you go back for your brunch, you will be charged $2.25. To be safe, sign your food checks only twice a day—once in the morning between 7:30 a.m. and 12 noon, and once in the evening between 5 and 9 p.m. You will be charged for anything that you eat between noon and 5 p.m. regardless of whether or not you have used any of your Modified American Plan.

Another advantage is that if you attend the special food functions you may sign for them on your Modified American Plan, and will only need to purchase a ticket at the Registration Desk for a small amount of the tax and tip. Otherwise, regional and other breakfasts will cost you $2.25, the Roundup buffet $4, and the banquet $8. (The prime rib and floor show are worth it.) On the Modified American Plan the additional cost for a special breakfast is 60 cents, the buffet 75 cents, and the banquet $4.

Dear Mickey:

My company is exhibiting at the Deauville Hotel during the DAVI Convention, but due to limited sleeping accommodations, we are staying at a nearby hotel. This makes it difficult for me to have a place to talk quietly with customers. Have you any suggestions? Anxiously yours,

EXHIBITOR

Dear Exhibitor:

The Deauville has small rooms called *cabanas* around the pool area. Why not rent one of these for the week?

Dear Mickey:

My husband is taking the children and me with him to Miami Beach in April. We have all outgrown our summer clothes. As I work, I won't have time to shop before leaving. Is there a shopping area near the Deauville?

HOPEFUL

Dear Hopeful:

There are shops in the hotel. And don't forget, all the after-Easter sales will be on, so you can save money on next summer's wardrobe.

Dear Mickey:

I work for the Government and get only $12 per day for expenses. Can I exist in Miami on this? What's the dope on tipping? Always,

FLAT BROKE

Dear Flat Broke:

The Deauville rates are $14 double, $11 single, plus $3 per person per day for the Modified American Plan. Rates at the Sherry Frontenac, which adjoins the Deauville, and the Monte Carlo are $10 double and $8 single.

They have the same food plan as the Deauville, which can be applied to the Convention food functions at the Deauville. At these two hotels, $16 per day will cover two persons in a room with two big meals a day. Tips should be gaged by the price on the menu—15 percent for food and 10 percent for beverage.

Dear Mickey:

I am going to attend the DAVI Convention at the Deauville Hotel in Miami Beach, Florida, April 24-28, and I am quivering in anticipation! I can hardly wait! But I am also worried—what does a gal wear in Florida in April?

EXCITED

Dear Excited:

Resort wear at Miami Beach is cool, casual, and comfortable. Light-weight suits, colorful cottons—especially sun dresses with little jackets—are popular during the day. Cocktail dresses are perfect for dinner dancing or night-clubbing. For less formal after-five activities, bright prints or sheers are smart. These are also nice for the hotel dining room. A light-weight topper or stole will be needed for cool evenings. Remember, the hotel is air conditioned, so you may need a sweater while attending the meetings.

Dear Mickey:

I plan to attend all the daytime sessions of the convention, but I also want to see a bit of night life. What do you suggest? Best regards,

NIGHT OWL

Dear Night Owl:

On Monday night the Keynote Session will keep you busy until 10:30 p.m. On Tuesday night the Florida hosts have arranged an optional visit to the Carillon Night Club at 11 p.m. Floor show, dancing, a hot turkey sandwich and coffee, for $4. On Wednesday you can go night-clubbing after evening sessions (or see a presentation at the Deauville by Don Hunter). If you want night life, the Deauville has it!

Dear Mickey:

I live in New York and have quite a reputation for my chic hats. What type will I need when I attend the DAVI Convention in Florida? Sincerely,

WONDERING

Dear Wondering:

One for sun bathing. Except on the beach you seldom see a woman with a hat on in Florida.

Dear Mickey:

I am attending the DAVI Convention at the Deauville, and would like to take advantage of the sunshine to get an early tan. What is the quickest way to do this? Yours truly,

WINTER WHITE

Dear Winter White:

At this time of the year it is warm enough to tan and swim between 10 a.m. and 4 p.m. Lounge chairs and towels around the pool are a dollar a day. Straight canvas chairs are free. If you prefer the beach, you'll need your own towel. Take it easy; a sunburn can spoil an otherwise wonderful week.

Dear Mickey:

I understand the Deauville is very "Ritzy." Do I have to wear a coat and tie? I would prefer to go Native.

BEACHCOMBER

Dear Beachcomber:

Bathing attire or shorts will not be permitted in the Main Lobby or public rooms at any time. Dress for swimming in your room and take the elevator to the Lower Lobby. Robes and footwear are required. Walking shorts with knee-length stockings are permitted in the Main Lobby until 6 p.m. Gentlemen are requested to wear tie and jacket in the Main Lobby and all public spaces after 6 p.m. Guests entering the hotel after 6 p.m. dressed in shorts or bathing attire will be requested to use Lower Lobby elevator entrances.

Dear Mickey:

I am bringing my family with me to the DAVI Convention, so I am driving. After I get into Florida, which highways go into Miami? Sincerely,

BARNEY OLDFIELD

Dear Barney:

Check the enclosed map. Florida has wonderful dual highways and you'll enjoy driving through that beautiful state.

looking at

new literature

How Good Is the Yardstick?

Schofield Evaluates "the Criteria"

Evaluative Criteria: 1960 Edition. National Study of Secondary School Evaluation, Washington 6, D. C. 1960, 376 p. $5, paperbound $4. (Formerly the Cooperative Study of Secondary School Standards.)

Significantly, the 1960 pattern for evaluating secondary schools prefaces SECTION F: INSTRUCTIONAL MATERIALS SERVICES with this guiding principle: "The best teaching occurs when the student is brought into effective contact with important ideas and experiences in such a way that learning results and that the student will continue to seek further learning on his own initiative."

From this premise the introductory statement goes on to enumerate the vast array of instructional materials which will facilitate the "best teaching." Among these are teachers, parents, peers and contemporary institutions, books, and "many new and wonderful devices which, while they cannot and should not replace books, offer their own unique contribution to the same ends, namely the recording and communication of ideas." The growth and expanding use of the latter apparently have been responsible for renaming SECTION F, which ten years ago was categorized under "Library Services."

The *Evaluative Criteria* reflects the prevalent, indeed long-standing, uncertainty in the field about the definition of an instructional materials center. This is not a criticism of the compilers of the *Criteria,* but the attempt here made to combine and yet to separate printed and non-book materials is a familiar one to all workers in this area. Interpretations that need to be made are therefore difficult. For instance, the instructional materials center is defined as "school library and audiovisual department." However, Criterion One states that "a staff member with special qualifications for the work is charged with responsibility for instructional materials services." The second criterion reads: "A professional audiovisual coordinator is charged with responsibility for audiovisual services." What conclusions may be drawn from these apparently conflicting statements? Is it that the *Evaluative Criteria* believes that two agencies separated are yet one? Is the person in charge of instructional materials as indicated in Criterion One the over-all administrator? Searching questions will occur to all users of the *Criteria* as these points are pondered.

The checklists for the staff provide criteria that are interesting to examine in terms of preparation, status, responsibilities and services. As these criteria are applied to specific situations, especially where the library and the audiovisual departments are independent of each other, the evaluators will have to choose carefully the points being considered in the separate divisions and note those which are in common. As an example, Point 6 under 1, B. Preparation calls for specialized preparation in "the selecting and securing of printed and audiovisual materials." If the agencies—library and audiovisual—are separate, presumably each staff member will need part, but not all of the preparation implied. (Even if separate, though, the presence of both capabilities might be desirable in both persons!)

In general, the organization of the criteria and their language is consistent with previous editions. Expansion has taken place, however, and opportunity exists for making a more thorough appraisal of a school's program in the field of all types of instructional materials. Considerably more data on the care and repair of audiovisual materials and equipment appear in this edition. Standards for both physical facilities and equipment are expanded helpfully.

Each evaluator considering the many criteria noted in the checklists undoubtedly will react to individual points in terms of his own experience and training. To this reviewer the provision of a yardstick for financial provisions regarding rebinding of printed materials seems unrealistic. More important might be the provision of funds for *binding* materials which need permanent storage in the library. Even the mention of an accession book in the section on classifying and cataloging seems to raise an archaic practice to some degree of practicability or respectability! On the other hand the summary sheet used in analyzing the holdings of the library arranged by Dewey class number is a vast improvement over the previous data collection methods. The simpler format lends itself equally well for the purpose and reduces the onerous task previously required wherein many subdivisions of the major class numbers had to be calculated separately.

Unfortunately, certain criteria are so stated that they leave no room for alternative solutions. Requirements such as "the center includes a glass-enclosed office" are obviously arbitrary and not the satisfactory solutions for some schools. If staff is sufficiently large, an office which is not glass-enclosed might be much more useful. A final bias causes this reviewer to cringe when the word catalog appears as "catalogue."

Considered as a whole, however, the *Criteria* offers as workable a design for measuring the effectiveness of the instructional materials program as educators have yet devised. The underlying philosophy includes data of value and clearly defines the major purposes of instructional materials centers. It spells out these purposes in a four-fold statement: (1) "providing a rich variety of materials, including books and other printed materials, recordings, still and motion pictures, filmstrips, and other audiovisual materials and resources, for use by teachers and students as individuals and in groups; (2) offering leadership in developing techniques for the use of various materials by teacher and students; (3) making available facilities, services and equipment necessary for the selection, organization and use of instructional materials; and (4) furnishing facilities for and assistance in the production of instructional materials and displays."—E.T.S.

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IN CANADA—ANGLOPHOTO LTD., MONTREAL

Communicating Quantitative Data: Graphs, by James E. Parker. College bookstore, North Carolina College at Durham. 1960. 46 p. $1.50. (Quantity orders from Edwards Brothers, Inc., Ann Arbor, Michigan, 20-cent discount.)

Deals with kinds of graphs and their uses—multiple, grouped, subdivided bar graphs, circle graphs, line graph, pictographs and equation graph. Designed primarily as supplementary course material for students in audio-visual education courses, it emphasizes the role of the graph in our modern system of communications. Simplification of the complex mathematical concepts sometimes involved in the construction of graphs is a marked value of the presentation by James E. Parker, director of the AV center at North Carolina State College.

Through the use of the manual a student gains some knowledge of when to use a graph, why one type of graph is more significant than another for particular situations, how to construct the appropriate graph and equally important—what kind of distortions and misrepresentations are possible through the media.

The illustrations are excellently utilized and the bibliography contains not only reference to other printed materials but also a listing of films and filmstrips.—E.T.S.

Encouraging the Excellent, by Elizabeth Paschal. The Fund for the Advancement of Education, 477 Madison Avenue, New York 22. 1960. 80 p. Apply.

Although this report illustrates the efforts being made to enrich or accelerate programs for the gifted or able student, the findings emphasize the fact that programs geared to the needs of the gifted child also "benefit others through the basic changes in school practices in the use of resources and the acquisition of well educated teachers." Examples of activities range from those developed in the public schools of Portland, San Angelo, San Bernardino and Hicksville to a discussion of summer programs in science and math, junior great books programs, and honors programs in Brooklyn College and Seattle University.

The conclusions reached are of interest to all educators. Those working with materials will be challenged especially by the following: (1) evidence of effective use of new resources for education; (2) experiences which "enable wise and imaginative teachers to reach more students," (3) new curricula needed to "prevent wasteful overlap and duplication . . . and to take advantage of the new knowledge scholars have discovered in many fields;" and, (4) training students "to learn more independently."—E.T.S.

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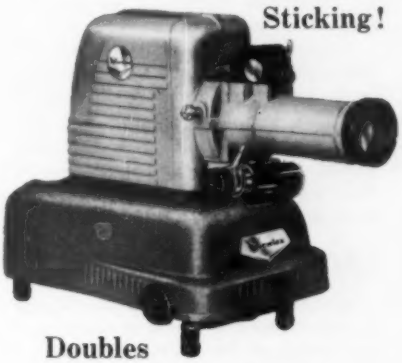

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Teaching Machine Theme Prevalent in February Meetings

FOLLOWING the San Jose conference reported visually on page 146-47, a number of AV meetings in February featured the teaching machine theme.

The Florida state department of education and Florida State University conducted a two-day meeting on "Teaching Machines and Programmed Learning" (February 16-18) with A. A. Lumsdaine as major speaker and conference summarizer.

Dr. Lumsdaine's keynote topic, "It's All in the Program," was followed by sessions on Learning About Specifics Through Sample Programs, and The Use and Evaluation of a Program. Russel Kropp, Florida State University, conducted demonstrations sessions one afternoon and evening.

California

Harry J. Skelly presided at a session on automated instruction at the annual conference of the Audiovisual Education Association of California, February 2-4, at Long Beach. Sidney C. Eboch, assistant professor of education at San Jose State College, Robert F. Mager, Varian Associates, and Robert E. Corrigan, president of Corrigan Associates, appeared on the program with these topics: What Are Teaching Machines and Programmed Learning? What Are Teaching Machines Doing to Teaching? and, Programming for Automated Instruction. Edgar Dale gave the keynote on the conference theme: "The Challenge of Knowledge."

Arizona

Del Shelley, director of audiovisual aids for the Phoenix elementary schools, was chairman of the session on automated teaching programs when the Arizona AV association met for its annual conference in Tempe, February 17-18. Vernon Gerlach, instructor in the Washington School at Phoenix gave the presentation. Other sessions of the meeting were: 8mm Sound Motion Pictures; Teaching With the Overhead Projector; and several joint sessions with allied groups in the Arizona Education Association such as the Reading Council, the State Library Association, and the Arizona ASCD.

New Officers for the Arizona AV association are: President, Lewis Phelps, AV director, Mesa; Vice President, Worthy Ragsdale, Madison; Treasurer, Sam Hunter, Arizona State University; Recording Secretary, Irene Andrews, Creighton; and Corresponding Secretary, Irene Farnbach, Osborn.

NAVA

NAVA conducted a session on "Teaching Machines and the AV Dealer" at its Western Conference in Coronado, California, February 21-23. The session took the form of a panel discussion with Brad Heard of Photo and Sound Company, San Francisco, as moderator. Other panel members were M. Deutsch of Rheem Califone; Norman Crowder, Western Design; Howard Turner, DuKane Corporation; and Ted Waller, Grolier Society.

During a question and answer period these four were joined by four educators in the persons of Robert Burgert, San Diego City Schools; Henry McCarty, San Diego County Schools; James Kinder, San Diego State College; and Frank Oetting, LaMesa-Spring Valley.

Columbia Plans Joint Conference

A THREE-DAY conference on "Audiovisual Services and the School Library Program" will be conducted on the Columbia University campus, June 27-29, under the joint sponsorship of the Columbia University School of Library Service and the Teachers College.

Conference co-chairmen are Frances Henne of the Library School and Paul Witt, Teachers College.

The conference will open with addresses and general discussion on the status of audiovisual communication in contemporary society; the findings of research in the areas of audiovisual instruction and learning; and, recent trends and experimentation in the use of newer media of communication, including television and teaching machines.

Later addresses will be devoted to qualitative and quantitative standards for audiovisual services in school library programs; the teacher's use of the audiovisual services of the school library; principles and practices as related to library programs in elementary and secondary schools, and the implications for schools and school libraries of the new apparatus for retrieval of knowledge. Among speakers announced are: Edgar Dale, Paul Witt, Arthur Foshay, Anna L. Hyer, and Phil C. Lange. Speakers representing the library field are Eleanor Ahlers, AASL; Sara Fenwick, University of Chicago; Margaret Nicholsen, Evanston, Illinois; Verner Clapp, president, Council on Library Resources, Inc., Irving Lieberman, University of Washington; and Frances Henne.

The conference will also arrange group meetings in which participants can discuss problems, techniques and experiences. These groups will be organized under the leadership of consultants as follows:

- For directors of instructional materials in city school systems: Max R. Brunstetter, professor of education, Teachers College, Columbia University
- For directors of instructional materials in county school systems: Frances Hatfield, supervisor of instructional materials, Broward County Schools, Fort Lauderdale, Florida
- For elementary school librarians and teachers: Mrs. Patricia Cory, librarian and director of visual education, Lexington School for the Deaf, New York, New York
- For junior high school librarians and teachers: Dorothy H. Currie, supervisor of school libraries and audiovisual instructional materials, Yonkers Public Schools, Yonkers, New York
- For senior high school librarians and teachers: Edward T. Schofield, director, department of libraries and audiovisual education, Newark Public Schools, Newark, New Jersey

The conference fee is $20. For further information and registration forms, write to: Office of the Dean, School Library Service, Columbia University, New York 27.

Overhead TV

Among the many applications of closed-circuit television to instruction now being studied by the University of California, the one receiving the most widespread attention from the faculty is the use known as the "classroom magnifier," or "overhead TV."

This UCLA development is remote from the usual concept of "educational television" in that it takes place completely within a single classroom or lecture hall, with the equipment functioning as a device to magnify, multiply, and distribute pictures of instructional materials to the class. A single small television camera about the size of a cigar box is mounted over a desk or table, pointing straight down. The camera is connected by wire to one or more TV receivers situated in the room, facing the students. Visual materials placed by the instructor beneath the camera are seen on the receivers by the students. A "zoomar" lens provides the instructor with the ability to vary the amount of space "seen" on the desk from a few square inches to over a square foot. The instructor can magnify a small object or a small portion of a large object up to the full size of the TV screen.

The system will handle a wide variety of visual items, from written materials or drawings to three-dimensional objects such as artifacts or meters. It provides a flexibility in instruction in that materials do not have to be pre-recorded to permit their use in conventional projectors. Anything that can be placed under the camera can be used.

This type of television is now in use in 18 courses totaling 40 hours a week on the Los Angeles campus, and is being tested on the Berkeley and San Francisco campuses.—from the *University Bulletin*.

PICTURED on the left is DAVI's executive secretary, Anna L. Hyer, presenting Lawrence G. Derthick, recently appointed NEA assistant executive secretary with the 4999th copy of TEACHING MACHINES AND PROGRAMMED LEARNING. *Since publication in October, TMPL has become an educational best-seller with 5000 copies sold in less than 90 days. A third printing is anticipated here, and French and Japanese editions are under discussion. Editors Lumsdaine and Glaser are gathering papers for a first supplement, also to be published by DAVI.*

A **CONFESSION** TO ALL AUDIO VISUAL DIRECTORS

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THE BEST CLASSROOM SCREEN

... that you or your students have ever laid eyes on (oops — shouldn't end a sentence with a preposition).

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You've seen screens that were virtually held together with spit and picture wire, the rivets in the hardware loose and falling out — Our best classroom screen, *we must confess* uses only heavy gauge durable hardware.

You've seen screens whose metal parts were so poorly finished that your hands got black from the oxide coating — Our best classroom screen, *we must confess*, has metal parts that are triple coated in chromium and will last and last and last.

In addition, up to now you had to buy either a wall type or a tripod type screen . . . or both — Our screen, *we must confess*, is convertible . . . you can use it either way!

OUR FINAL CONFESSION . . .

We have allocated 500 of our new screens for field reaction . . . offering them at a special low, low introductory price on a first-come, first-served basis. Will accept firm orders *now* for fall term delivery, if you so wish. Please don't write for literature — we haven't any! But, if you clip the coupon below we'll let you know how much these new screens are and how you may obtain them. We promise you . . . you won't be sorry"

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CINE Presents Awards

Holding the Golden Lion of St. Mark is Antonio Frasconi whose woodcuttings were used in NEIGHBORING SHORE, arts film winner at the Venice festival. Left to right are Chairman Ralph Hoy of CINE; Leslie Glass, information minister of the British Embassy; Mr. Frasconi; and Elio Pascarelli, press counselor of the Italian Embassy. Ceremonies took place January 27.

APPROXIMATELY 500 invited guests witnessed the presentation of awards to winning U. S. entries in the Venice and Edinburgh International Film Festivals at the NEA auditorium in Washington, D. C., January 27. A screening of six films from the two festivals followed the presentation.

Preceding the auditorium events, Dr. and Mrs. William G. Carr entertained at a dinner party for embassy guests, CINE members, and producers of the award-winning entries.

Elio Pascarelli, press counselor of the Italian Embassy, presented these awards to the four winning entries in the 1960 Venice International Film Festival:

Golden Lion of St. Mark to *Neighboring Shore*, grand prize winner in the art films exhibition; produced by Robert Graff, Sextant, Inc.

Special Award of Honor to *Mark Twain's America*, documentary film category; produced by Donald B. Hyatt, NBC.

Silver Bucranium to *Fusiform Aneurysm of Aortic Arch, Resection, and Replacement with Dacron Graft*, Padua Exhibition of Scientific-Didactic Films; produced by Baylor University, College of Medicine.

Special Mention to *Culdoscopic Technique and Cinematography*, Padua Exhibition of Scientific-Didactic Films; produced by Audio Productions Inc., and sponsored by Schering Corporation.

The Diploma of Merit went to *Rhapsody of Steel*, a prize winning entry in the 1960 Edinburgh Festival. The film was produced by John Sutherland Productions and sponsored by U. S. Steel. Leslie Glass, information minister of the British Embassy, made the presentation.

Films shown following the ceremonies were: *The Little Casartelli Circus*, an Italian prize winner at the Venice Festival; *George IV: Edinburgh*, a British winner at Edinburgh; *Interview*, a three-minute cartoon produced by Pintoff Productions, *Rhapsody of Steel, Neighboring Shore*, and *Mark Twain's America*.

Presiding at the ceremonies was CINE Chairman Ralph L. Hoy, director of motion pictures and exhibits for Aluminum Company of America.

CINE will be processing non-theatrical and short subject films for these 1961 international film festivals: Venice, Edinburgh, Vancouver, Berlin, Harrogate, Mannheim, and Stratford.

APPLICATIONS NOW FOR DAVI MEMORIAL SCHOLARSHIP

Again this year the DAVI Memorial Scholarship Committee (formerly the Helen Rachford Memorial Scholarship Committee) will award a $500 cash scholarship for graduate work in audio-visual education. The award will be made this spring to the student who, in the opinion of the committee, is most deserving. If you would like application blanks for this scholarship, please address your requests immediately to Robert C. Snider, DAVI, 1201 Sixteenth Street, N. W., Washington 6, D. C.

AVCR To Carry Title VII Abstracts

THE U. S. OFFICE OF EDUCATION has contracted with DAVI to abstract all research completed under Title VII of NDEA.

The contract states that the "contractor [DAVI] will (a) prepare abstracts on every completed Title VII research project, following a uniform style and maintaining a high level of reliability; (b) publish, so as to reach media researchers and communication specialists, quarterly compilations of all abstracts; and (c) include in each quarterly compilation a critical review or essay by a key researcher or educator pointing up the significance of studies included and relating them to other prior and ongoing research.

"In addition to provision of copies of the quarterly compilations to the U. S. Office of Education for distribution to educators and others on its mailing lists, the contractor will distribute copies of the compilations to subscribers of *AV Communication Review* and make available single copies on request at a handling and mailing fee of 35 cents."

Duration of the contract (which is financed under Part B, the dissemination clause of Title VII) is from January 3, 1961 to March 1, 1962.

The research abstracts will be prepared by William H. Allen, *AVCR* editor, whereas the critical reviews are expected to come from a number of contributors.

Copies of these quarterly compilations will be carried as inserts in each regular issue of *AVCR*. The Educational Media Branch of the U. S. Office of Education will receive 4500 copies for distribution to its mailing list and cooperating libraries, and about 1000 copies will be available from NEA Publication Sales for a handling charge of 35 cents.

A Note of Thanks

To DAVI members:

Only once in a lifetime could one even anticipate having an honor of such magnitude bestowed upon him as President-Elect of DAVI. I accept this honor humbly and with a deep sense of appreciation for the confidence you have expressed in me.

I will certainly do everything humanly possible to assist and support the President and staff of DAVI, represent the organization in the manner exhibited by the fine people previously occupying this responsible position, and see that at no time will you, as DAVI members, feel that you have misplaced your confidence.

I would like to express a special "thanks" to the many members of Audio-Visual Directors of Ohio (AVDO), who expended efforts on my behalf during the election.

Please *each of you*, accept my personal "thanks a million," and God bless all of you. —CLYDE K. MILLER

Clemens Commended

One of Dr. Derthick's last official acts as U. S. Commissioner of Education (before accepting his appointment as NEA assistant executive secretary) was a letter of commendation to Thomas D. Clemens for "persistent and consistent efforts to improve the quality and quantity of research projects in the field of educational media." Dr. Derthick cites "high-level accomplishments on task force assignments" and "visual presentations used by the Office of Education to report progress on NDEA programs."

Mr. Clemens is research coordinator for the Educational Media Branch.

Planning for Okoboji

Meeting in Lincoln in February, Wes Meierhenry, chairman of the planning committee, and Lee Cochran, ex-officio member, plan for Seventh Lake Okoboji Conference. Dates: August 19-23.

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A DOZEN DO'S AND DON'TS

for planning and operating a language lab or an electronic classroom in a high school*

1. DO hire a consultant (not employed by a lab equipment manufacturer), to help you plan, evaluate bids, do the final checking of installed equipment.

2. DO define your teaching objectives first and then choose equipment that will implement them.

3. DO see at least three different types of successful installations in operation before you decide on your equipment.

4. DO follow the instructions and guidelines (p. 26-28, 263-287) in the Council of Chief State School Officers' *Purchase Guide* (Ginn and Co., 1959) and its *Supplement* (Ginn and Co., 1961).

5. DO arrange your seating and equipment with provision for viewing as well as hearing and speaking.

6. DO write exact specifications into your contract and accept delivery as completed only when the equipment tests up to specifications and functions smoothly for a full month and when there are adequate provisions for servicing.

7. DO build an expandable and flexible lab, to handle future increases in demand and new improvements in equipment and methods.

8. DO provide for regular preventive maintenance, with an annual budget of 3 percent to 5 percent of your total initial cost.

9. DO plan for short lab sessions; 20 minutes of active daily use is the ideal.

10. DO insist that the lab work be an integral part of the foreign-language course.

11. DO urge each teacher who is to use the lab to study the growing literature on the subject and take a workshop course.

12. DO cut in half the teaching load of the lab director and allow released time for all teachers who prepare lab materials.

1. DON'T try to do it yourself; planning a lab requires as much knowledge as planning a school *and* a radio station.

2. DON'T leave the planning entirely to administrators or AV specialists, who may know little about foreign-language teaching.

3. DON'T plan a lab for use by everyone (foreign languages, English, shorthand, speech); this will result in confusion and frustration.

4. DON'T forget that a lab is no stronger than its weakest component, mechanical or human.

5. DON'T accept inferior sound; it should be free of extraneous noise, and as natural and full-ranged as a live voice.

6. DON'T forget Murphy's Law of Electronics: Anything that *can* go wrong *will*.

7. DON'T overlook the alternative of electronic equipment in each foreign-language classroom instead of a single lab.

8. DON'T forget to budget for tapes, discs, and other expendable equipment.

9. DON'T expect *all* your equipment to function all the time; provide 10 percent to 20 percent spare parts or use only 80 percent to 90 percent of capacity.

10. DON'T impose the lab program on unwilling or unprepared foreign-language teachers; start with one beginning course taught by an enthusiast, make it a success, then add other courses one at a time.

11. DON'T expect the foreign-language teacher to teach and operate the lab at the same time; hire a technician to assist him.

12. DON'T expect the lab to reduce the teacher's work; it will increase it, redistribute it, re-orient it, and make it more effective.

---

* "Lab," as used here, may refer to any installation of foreign-language teaching equipment. The lists above were assembled from suggestions made by participants in two conferences on the language laboratory planned by the Modern Language Association under contract with the U. S. Office of Education and held in New York on November 27-28 and December 18-19, 1960. The participants: Jeannette Atkins, Dora Bashour, Genevieve Blew, Remunda Cadoux, Pierre Capretz, Vincenzo Cioffari, Guillermo del Olmo, Frederick D. Eddy, Mary Finocchiaro, Evangeline Galas, Donald Hamlin, Elaine Hardie, C. Cleland Harris, Alfred S. Hayes, Elton Hocking, Joseph Hutchinson, Robert Iglehart, Emile Jalbert, Sylvia Levy, William N. Locke, Sarah Lorge, A. T. MacAllister, Gustave Mathieu, F. Rand Morton, Anna I. Nolfi, Earle S. Randall, A. K. Shields, William J. Smither, Edward M. Stack, Donald D. Walsh.

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Cliff Welch Wins Navy's Highest Award To Civilians

Cliff Welch

Clifford A. Welch, director, U. S. Naval Training Aids Center, was awarded the Navy Superior Civilian Award November 14 for his service to the Navy and the Mutual Assistance Program.

Capt. Joe L. Bettinger, Jr., commanding officer, U. S. Naval Schools Command, Treasure Island, acted on behalf of the Navy Department in presenting the highest civilian award given by the Navy. The only higher civilian award is given by the President.

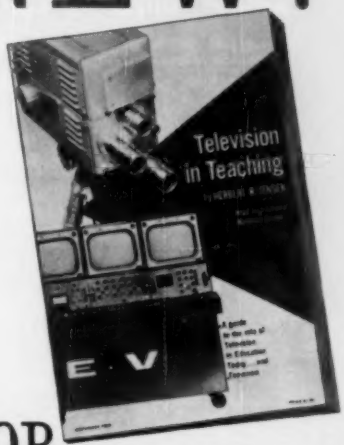
Mr. Welch assisted Adm. Harold M. Briggs, director of Pan American Affairs, by making numerous visits to South America and Mexico, helping their navies in adopting a workable training aid program.

As director of the Training Aid Center since December 1947, Mr. Welch has been responsible for improving the Naval training program through modern training aids in the Western Hemisphere.

Mr. Welch is a graduate of Stanford University receiving his BA degree in business administration in 1948, his MA degree in education in 1950, and His Ed.D. degree in education (audio-visual aids) in 1954. His degrees were earned after working hours while he was working full-time in training aids. He is also a commander in the Naval Reserve.

He lives in Redwood City, California, with his wife, Elizabeth, and their three children: Stephen, 12; Cynthia, 10; and Gregory, 8. —from *The Masthead*, San Francisco, Calif.

NEW!



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Membership Campaign: Harvest Time — Or Just Beginning?

by Florence Fan

THE answer could be either. For the early birds, it may be the time for them to start counting their fruits. For the late starters, it may be just the beginning and they will have to wait for the seeds to be germinated.

No matter when each one starts, we are happy to report that all regional leaders have taken their responsibilities seriously and most state membership chairmen are fully motivated and have started a vigorous campaign. Judging by the orders for promotional materials being filled by the national office, the ball is really rolling. This includes Canada, whose membership chairman is Cecil E. Wilkinson.

There is an increase in both business and institutional memberships. We now have 67 business members and 125 institutional members and hope there will be more coming in before Convention.

Up to the month of February, South Carolina is leading in the membership campaign. Next comes California, then New York, Texas, and Connecticut. The number of new members for February was 104, plus 47 expired members who were reinstated.

If each membership chairman can inspire the old members to renew their membership as well as recruit new ones, there should be no difficulty to reach our Convention goal—6000 members.

MEMBEROMETER

June 1 campaign goal	6200
Membership total to date	5157
Members to get to reach goal	1043

An unknown DAVI member in the Philippines is doing some work for DAVI, as we have received nine individual members recently from that country through a local subscription agency. Most of these new members are principals of elementary and secondary schools and professional groups. Since currency exchange is a problem for all foreign members, subscription agencies are in a position to render real service. A total of 32 new foreign memberships have come into the DAVI office during the past three months. This proves that DAVI is not only national but also international.

There are many new membership sponsors added to our award list this

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month. DAVI is also looking forward to making awards to the state organizations who have the highest percent of their state members enrolled in the national organization. Many states have already submitted their state membership lists for checking. We expect many more to come in before the Miami Convention.

Sabena Crash Takes Herb Myers

Herb Myers

THE AUDIOVISUAL FIELD sustained the loss of a loyal supporter and prudent counselor when the Sabena jetliner crash took the life of H. Herb Myers along with lives of other Americans, including the youthful figure skating team. Mr. Myers was 63.

As president of the Charles Beseler Company for the past 17 years, Mr. Myers won the respect of the field for his sound business judgment and genuine appreciation of the educational worth of audiovisual aids. Much of the popularity of the overhead projector as a teaching tool today can be attributed to his insight.

A staunch supporter of NAVA, and particularly the National Institute for Audiovisual Selling, Mr. Myers will also be missed by AV educators from coast to coast.

He is survived by Mrs. Myers, his son, Marty, and a daughter, Mrs. Ruth Berman. AUDIOVISUAL INSTRUCTION and the national staff of DAVI take this opportunity to pay tribute to a prominent figure in the audiovisual field and to extend sympathy to his survivors.

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Fifth Northeast Regional Draws 109 AV Leaders and Praise from Superintendent

Co-chairmen this Year

Co-chairmen for 1962

ONE-HUNDRED-NINE audiovisual leaders representing nine states from Maine to Pennsylvania met in Concord, New Hampshire, January 26-28, for the Fifth Northeast Regional Leadership Conference. Co-sponsored by DAVI and New Hampshire DAVI members (who organized their own state association during the conference), the three-day meeting opened with an address by Maurice Mitchell, EBF president, who set the stage with his topic: "Education Tomorrow: Meeting the Challenge."

Other major presentations included "The Impact of Changing Technology on the Curriculum," by Irene F. Cypher of New York University; "The Impact of Changing Society," by Carlton W. H. Erickson of the University of Connecticut; "The Soviet School and Its Challenge," by Clarence Bergeson, Pennsylvania State University; and "Implications for Instructional Environment," by Adrian TerLouw of Eastman Kodak.

Discussion groups were organized on the topics presented by three of these speakers—Dr. Cypher, Dr. Erickson, and Mr. TerLouw. These groups (four assigned to each topic) were arranged previous to the conference, thus assuring real participation for all attendants.

The conference was welcomed by Paul E. Farnum, deputy commissioner of education for New Hampshire.

Co-chairmen of the conference planning committee were Clarence Bergeson and Villa Quinn of the Maine state department of education. Elected as co-chairmen for next year were Herbert R. Jensen, director of the instructional materials center, Greenwich, Connecticut and Bob Danilowicz, supervisor of audiovisual aids, Rhode Island state department of education—R.C.S.

A SUPERINTENDENT'S COMMENT

After attending the Northeast Regional Conference, a New Jersey school superintendent wrote thus to his state commissioner of education.

"I found it to be a most stimulating and effective conference. The men up there were not just discussing the use of audiovisual materials; they actually dealt with the problems of education today and took a very broad and thorough look at the changes in our society, the changes in our economic order, and the relationships of these to a dynamic school system. I thought their conference far above any of the mundane things I see so often in group conferences. The use of audiovisual materials was, interestingly enough, only a by-product. They used the materials and devices only to highlight and underline the educational concepts they were considering."

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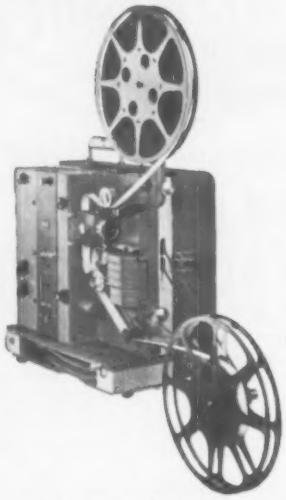

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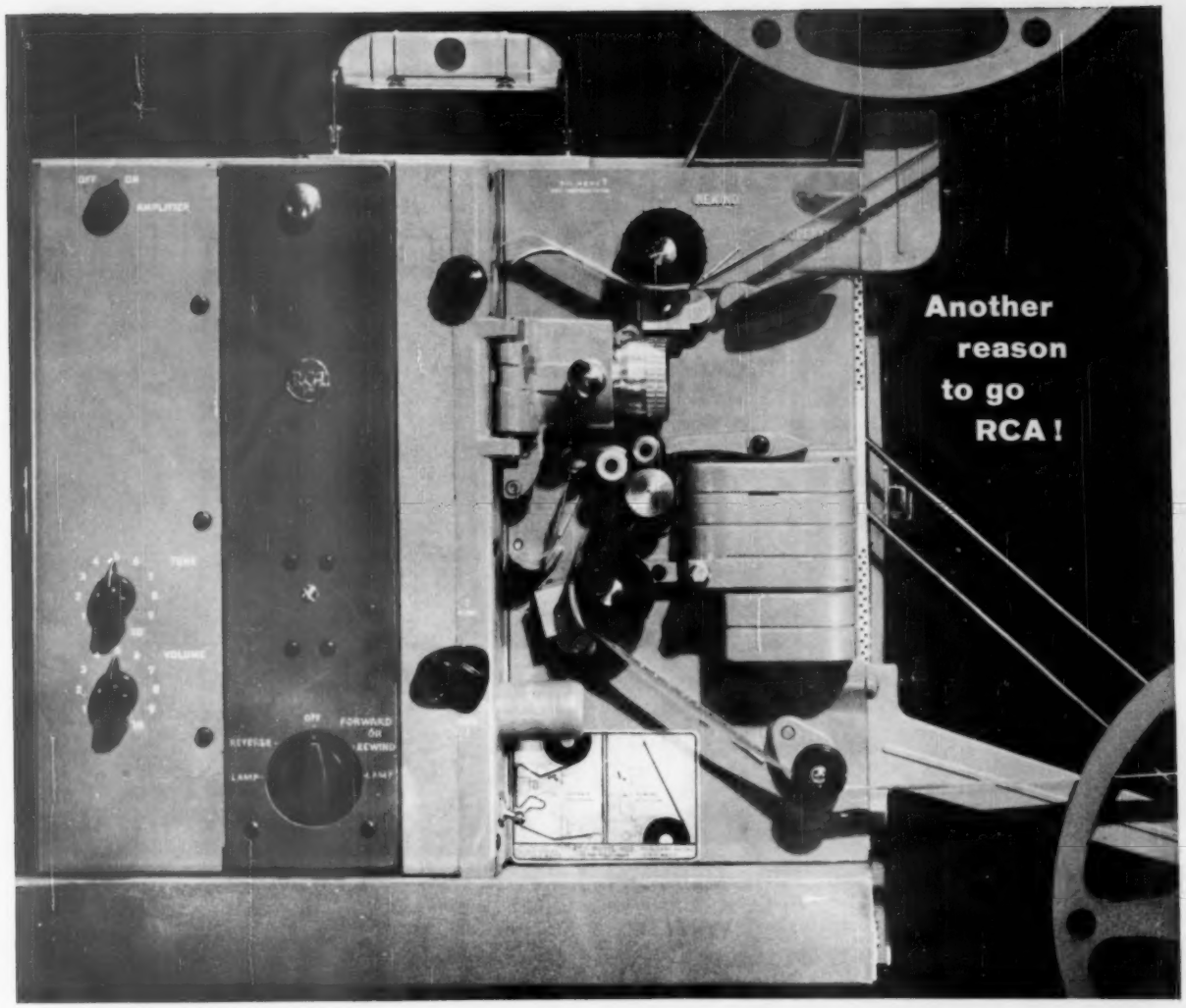

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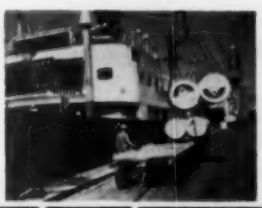

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- ☐ **Rockets and Satellites** (Now) ME, JH
- ☐ **Weather Scientists** (Now) ME, JH
- ☐ **The Ocean of Air** (Now) P, ME
- ☐ **Way Stations in Space** (Now) ME, JH
- ☐ **Finding Out About Rocks** (Now), P, ME
- ☐ **The Story of Heat** (Now) ME, JH
- ☐ **Light and Its Story** (Now) ME, JH
- ☐ **Gravity, The Mighty Pull** (Now) P, ME
- ☐ **The Story of Magnetism** (Now) ME, JH
- ☐ **Particles of Matter** (Now) UE, JH
- ☐ **Controlling Atomic Energy** (Now) UE, JH
- ☐ **Planets Around Our Sun** (Now) ME, JH
- ☐ **The Milky Way and Beyond** (Now) ME, JH
- ☐ **The Soil and Life** (Now) ME, JH
- ☐ **Measuring and Testing Things** (Now) ME
- ☐ **World of Micro-Life** (Now) ME, JH
- ☐ **How the Water Cycle Works** (Now) ME, JH
- ☐ **Materials of Our World** (April) ME, JH
- ☐ **How Materials Are Changed** (April) ME, JH
- ☐ **Friction, Pushes and Pulls** (April) ME, JH
- ☐ **Balancing Things** (April) P, ME
- ☐ **You and Machines** (May) ME
- ☐ **Inside the Weather** (May) UE, JH
- ☐ **Power and Work** (May) P, ME
- ☐ **Wise Use of Water Resources** (May) ME, JH
- ☐ **How Green Plants Make Food** (May) ME, JH
- ☐ **How Do We Find Out** (May) P, ME
- ☐ **Nitrogen and Living Things** (June) ME, JH
- ☐ **Electricity in Our Lives** (June) ME, JH

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ME—Middle Elementary JH—Junior High

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- ☐ **Hawaii, The Island State** (Now)
- ☐ **The Republic of the Philippines** (Now)
- ☐ **Turkey, A Middle East Bridgeland** (Now)
- ☐ **Puerto Rico, Island in the Sun** (Now)
- ☐ **Finland, Farmer-Woodsman** (Now)
- ☐ **Germany, The Southern Uplands** (Now)
- ☐ **Spain, Three of Its Faces** (Now)

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LEADING MAKERS OF PHONO CARTRIDGES, SPEAKERS, MICROPHONES, TAPE HEADS, ELECTRONIC TUBES AND RECHARGEABLE BATTERIES

Quoteworthy

"By the way, I see that the professionals are not satisfied to leave the terminology of teaching machines alone. The literature now refers to auto-instructional devices. If anything confuses people and the lay public in the field, it's this trying to build a profession by changing labels.—AMO DE BERNARDIS (from a letter to the national office).

Films on Art is a 32-page listing compiled by Alfred W. Humphreys, Montana state supervisor of music, for the National Art Education Association. $1.50 from the Association, 1201 Sixteenth Street, N. W., Washington 6, D. C.

Personal Notes

HAROLD E. HILL, NAEB administrative vice president, joined the NAEB Washington office staff March 1. He was formerly at NAEB's office in Champaign, Illinois.

WANDA DANIEL DOMINO writes that both she and the Shaker Heights school system have been put in an awkward position by letters addressed to Mrs. Domino as audiovisual director. ROBERT S. HEIL is AV director for the Shaker Heights public schools. Persons wishing to reach Mrs. Domino should address her at 3006 Kingsley, Shaker Heights, Ohio.

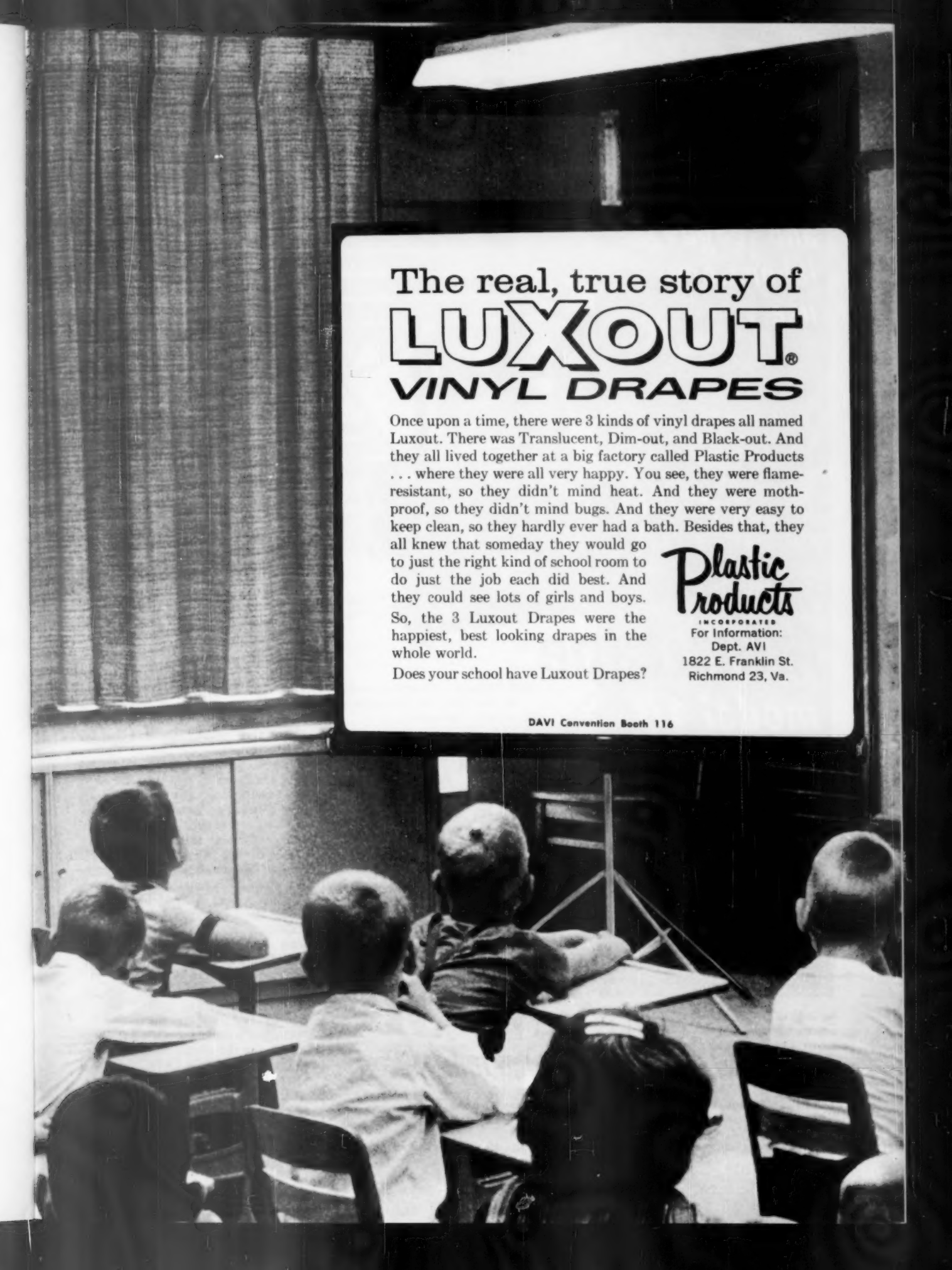
AMOS CLAYBAUGH, instructor in audiovisual education at Colorado State College for the past two years, received his doctorate in education in December. He will remain at the Center as a member of the staff. HAROLD BOWMAM, director of the Center, writes that Colorado State's graduate council has approved a master of science degree with a major in audiovisual education.

IN JANUARY Hawaii welcomed its first state audiovisual director, WILLIAM H. DURR, who had been supervisor of teaching materials for the Virginia state department of education for the past 14 years. Hawaii, which is making plans for an expanded audiovisual program, will have an experienced man in Mr. Durr. He first entered the AV field in 1938 as AV supervisor for the Aberdeen (Washington) City Schools. He has taught AV courses at Western Washington College and at the Universities of Iowa and Florida. He is a past president of ACSSAVO. SELDON H. WATKINS is his replacement at Richmond.

DONALD SCOTT, formerly curriculum coordinator for the Neenah (Wisconsin) public schools, has been appointed superintendent of schools in that city.

K. LOUISE NANGLE, Lynn, Massachusetts, has been named "Woman of the Year in Education" by the *Lynn Daily Evening Item*. The tribute was paid to Miss Nangle in recognition of her work as director of the audiovisual program in the Lynn schools.

WILLIAM F. KRUSE announces the transfer of all good will, commitments and accounts of the public relations firm that bears his name to a newly formed Illinois corporation, Audio-Visual Media, Inc., 2052 N. Lincoln Park West, Chicago 14, Illinois. Mr. Kruse will continue as consultant for



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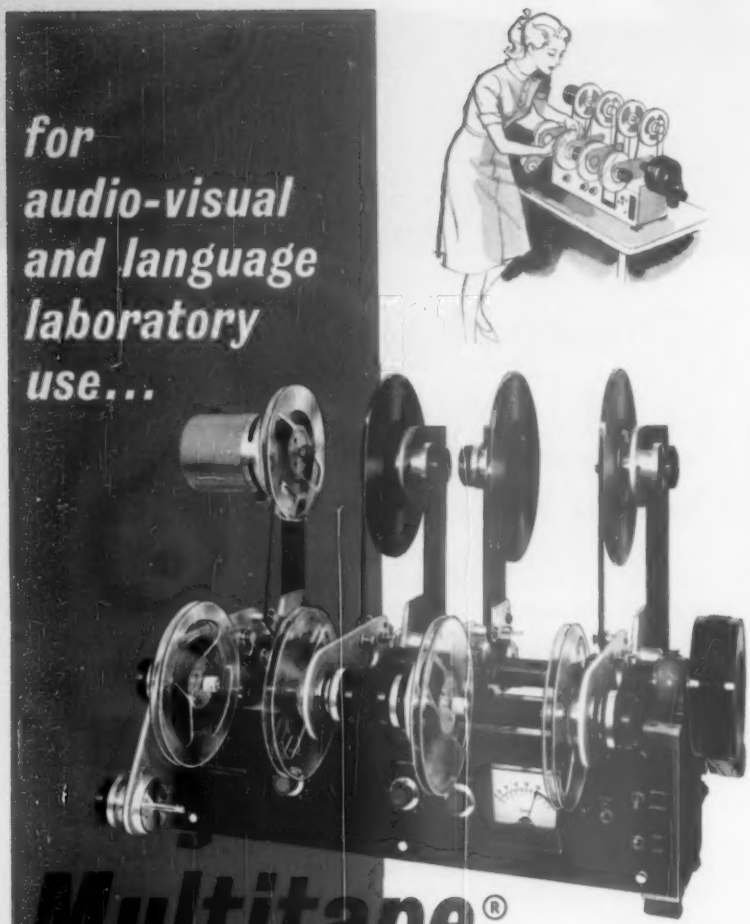

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only two of his former accounts—Family Films, a Hollywood producer of religious films, and *Ed Screen*.

JACK V. EDLING has accepted a temporary appointment as senior research coordinator for the New Media Branch, U. S. Office of Education. He was formerly associated with the Oregon System of Higher Education.

From the States

Michigan Officers

Helge Hanson, AV director at Dearborn, is 1961 president of the Michigan Audiovisual Association. He succeeds Ford Lemler. Daniel S. Lirones, consultant at the audiovisual education center at the University of Michigan, is secretary-treasurer.

New York State Meeting

Among speakers at the annual meeting of the New York State Audio-Visual Council in Syracuse were J. J. McPherson of the U. S. Office of Education who discussed the role of the educational media in large and small group instruction, and Howard R. Silver of Sonocraft who spoke on automated teaching. Other presentations covered one-camera closed-circuit television; film production; teaching machines; language laboratories; and the New York regents plans for TV.

Irene Cypher of New York University reported on the Council's NDEA Title VII project, *To Improve the Dissemination of Information About New Instructional Media and Their Use Within a State*. Banquet Speaker Lucille Lindberg of Queens College whose topic was "Soviet Education As I Observed It" said that one of its chief characteristics was the high regard with which Russians view teachers and education. Luella Snyder, former Council secretary and originator of the Council's Title VII project, was cited as recipient of the organization's annual award for outstanding service in the field of audiovisual education.

Officers for 1961 are: President, John McCagg, East Meadow; Vice President, Edward May, Ithaca; Treasurer, William Lawler, Greece; and Secretary, Catherine Bailey, Troy.

Oregon Activities

Oregon laymen learned a lot about AV during the winter months, thanks to a television series by Milt Grassell of the Oregon System of Higher Education. Telecast during January and February, the program introduced various specialists to illustrate the dif-

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California

ferent types of instructional materials. Other news from the Oregon System of Higher Education is the establishment of a new Center for Research on Teaching—with primary emphasis on the new media.

The Oregon Audiovisual News, mouthpiece of the Oregon System of Higher Education which has been on the top of the DAVI booster list in recent months, culminated their campaign in a two-page pictorial spread in the March issue. Featured were members of the DAVI staff, TMPL, Lumsdaine and Glaser, and a photo depicting DAVI's international aspect.

The library and audiovisual departments of the Oregon Education Association met for luncheon and a joint afternoon session during the state meeting in Portland in March. Following the joint meeting, the two groups split for discussion sessions in conjunction with their separate business meetings.

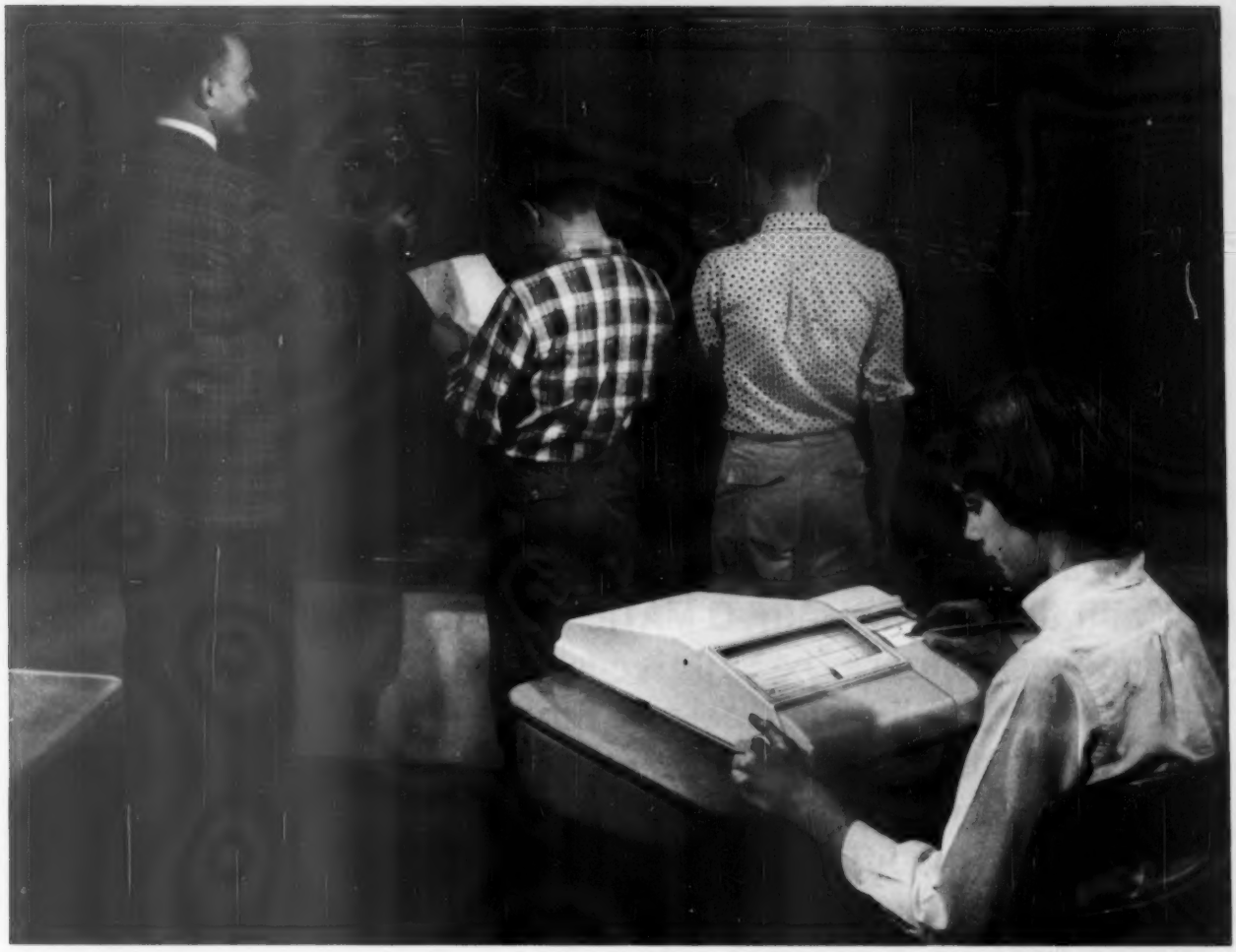
News from the Field

THE BUREAU OF AUDIOVISUAL INSTRUCTION at the University of Colorado is now offering a tape duplication service of some magnitude. Their brochure lists (1) a complete library of tapes at all levels of education as part of the Colorado Tapes for Teaching program (catalog available upon request); (2) the Glastonbury Basic Audio material (in five languages) and (3) duplication, editing, and distribution of educational, informational, or entertainment programs, from single copies to any number desired. Your inquiries are welcome at Tape Duplication Service, Bureau of Audiovisual Instruction, University of Colorado, Stadium Bldg., Boulder.

JAPAN HAS about 20 language laboratories in operation, 40 more under construction, and expects to have at least 100 installations in a few years. This news comes from Hiroshi Suzuki of Tokyo who has requested permission to translate the September 1959 issue of AVI ("Language Learning Today"). Mr. Suzuki and five young staff members of other colleges and universities are in the act of establishing the Language Laboratories Association of Japan. Parties interested in exchange of information can address Mr. Suzuki at Sibley House, ICU, Mitaka, Tokyo.

IN THIS AGE OF TEACHING MACHINES and television it is refreshing to note that films are still being given credit for their important role in education. The Sunday edition of the *Pittsburgh*

(See the next page)



"[teachers] can concentrate on the more creative art of illuminating the material"... SATURDAY EVENING POST AND READER'S DIGEST

Teaching machines are in the news! The most practical and inexpensive machine (sample sells for $32.00) on the market is the new KONCEPT-O-GRAPH.

The key to any machine is the quality of the program and the New KONCEPT-O-GRAPH handles all of those based on the Skinner approach. This includes single printed sheets, folded strip programs or the long roll style. *And you can design your own programs for the* KONCEPT-O-GRAPH! Mimeographed and Ditto programs work perfectly! Use drawings, color, large or small typewriting, printing or script; each is clearly seen and read through the large 4" x 8" window.

A simple knob moves the program past the window and automatically feeds consecutive pages without interruption. Just snap the machine open and insert the program. The student works at his own speed while the completed pages are retrieved inside the machine for review by the teacher.

A *detachable* answer unit is included with all sample orders. This extra machine feature works in synchronization with the basic unit, can be positioned for either right or left handed students, and accepts ordinary rolls of paper tape up to 3½" wide. *Saves you money by permitting the reuse of printed programs.*

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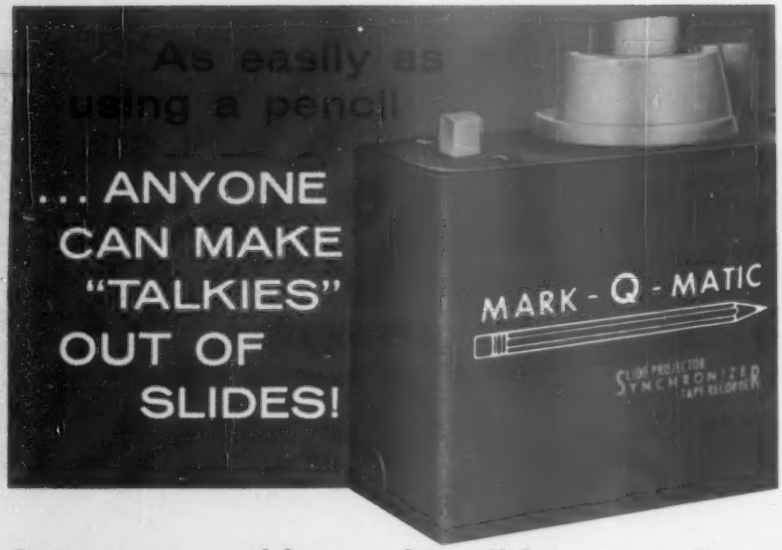
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News Notes—Continued

Press for February 12 devotes one page to Frederick D. Aldrich's work with the film rental library at Chatham College. Dr. Aldrich, assisted by Mrs. Vivienne Cupps, directs the second largest film rental library in the state (surpassed only by Penn State). [The Center was founded by James S. Kinder, now at San Diego State College.] Last summer Chatham, which serves the schools of Western Pennsylvania, was named depository for all Coronet films in the district and thus added 1000 new films.

AT A REORGANIZATION MEETING in February Ward E. Ankrum, president of the Arkansas AV association, was elected vice president of the Arkansas Educational Television Association. John G. Rye of Russellville is president. The association, originally chartered in 1955, has resumed plans for non-profit educational channels in Arkansas. Channels at Little Rock and Fayetteville are planned.

TECNIFAX CORPORATION announces the dates of its two special educators' conferences to be conducted in their "Visucom" Workshops in Holyoke, Massachusetts this summer. The first is scheduled for June 26-30; the second, August 28-September 1. These workshops have been approved by many superintendents for inservice or increment credit for teachers within their school systems. For details, write to Fred J. Pula at Tecnifax.

BY VOTE OF ITS MEMBERS on February 2, the Joint Council on Educational Television became the Joint Council on Educational Broadcasting. Reason: to reflect the Council's broadened interest which includes radio. David C. Stewart, who remains as secretary of the organization under its new name, has also been made director of the lately established Washington Office of NETRC.

WILMINGTON, DELAWARE, is one of six public school systems throughout the United States selected to try out a new series of social studies instructional films. The series, produced by the Eagleton Institute of Politics, the Ford Foundation, and McGraw-Hill Textfilms is planned to put a complete course in Modern Problems (problems of democracy) on film. To date, nine films treating the presidency and Congress are ready for use. The project has been designed and will be evaluated by Educational Testing Service, Princeton.—from *The Staff Reporter*, Wilmington public schools.

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Within recent years we have broadened our offerings to include a variety of educational materials . . . AND only where a real need existed. These projects have included Full-Year Courses on Film in both Physics and Chemistry, a Program in Biology, an Introduction to the Humanities Based upon Great Dramatic Literature, Record and Filmstrip Programs for Teaching Modern Foreign Languages at the Elementary-grade Level, Film Courses in Language, Tape for the Language Laboratory, and Programmed Learning Materials in Mathematics and in Languages.

There are no absolutes in instructional materials. We're quite satisfied to produce to meet varying educational needs in the realization that "THE CHOICE IS YOURS." And as educators it is your privilege to make that choice . . . carefully and critically. We will continue to test and research to determine the areas in which the need is greatest.

Still foremost in our program of endeavor is our original and continuing strong dedication to producing the finest in educational films and filmstrips based upon authenticity, experience, and integrity. We hope that you continue to share with us the feeling that exciting things are happening in audio-visual education . . . that many of them are happening at EBF.

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- ☐ The New EBF Program in Biology
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- ☐ A filmed Introduction to the Humanities based upon Great Dramatic Literature
- ☐ Films for Elementary Physical Science

Subject Area Booklets (Films and Filmstrips):

- ☐ Science for Elementary Grades
- ☐ Guidance, Health and Safety, Home and Family Life, Home Making, Driver Education, Physical Education — Primary, Middle, Junior and Senior High School
- ☐ Art, Arts and Crafts, Language Arts (including Science-Language Arts), Literature, Music — Primary, Middle, Junior and Senior High School
- ☐ Art, Art Appreciation, Arts and Crafts — Primary, Middle, Junior and Senior High School, College, Adult Groups
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Have You Seen These?

Persons looking for literature on the new media in education can add these periodicals to their bibliographies: the February 1961 issue of *Educational Leadership*, published by the Association for Supervision and Curriculum Development; and the High School Journal, published by the University of North Carolina.

The EFLA Service Supplement lists films and filmstrips on audiovisual materials and methods. Here is a sample table of contents: Animation; AV Centers and Film Library Operations; Bulletin Boards; Chalkboards; Equipment and Projection; Feltboards or Flannelgraphs; Field Trips; Film Councils; Filmstrips; Flat Pictures and Study Displays; Globes and Maps; Models; Dioramas and Exhibits; Motion Picture Production; Museums; Opaque Projectors; Research and Theory; Slides and Transparencies; Still Photography; Tape Recording; Television in Education; and Utilization. $1 for single copies from EFLA, 250 West 57th Street, New York 19.

Phil Lewis' *Educational Television Guidebook* is out and in the hands of *AVCR* and AVI reviewers. Available from McGraw-Hill at $4.95 per copy.

The AV Index is a 52-page listing of audiovisual literature. Part I gives information useful to all readers, including articles on AV tools, materials, and procedures. Part II highlights AV information in subject-matter areas. Single copies, $1.50 with quantity discounts. Audiovisual Research Institute, 1346 Broadway, Detroit 26.

School Libraries in Action (16mm, color) interprets the school's library services to pupils and teachers, grades 1 to 12. Five major areas are illustrated: planning for library use; guiding pupils' reading; teaching library skills; supplying instructional materials; and guiding reference work. Produced by the North Carolina Department of Public Instruction in cooperation with the University of North Carolina, the film is suitable for showings to school librarians, teachers, administrators, library school students, and lay groups. Rental prints for $4.50 from the Bureau of Audiovisual Instruction, University of North Carolina, Chapel Hill. Purchase orders should be addressed to Cora Paul Bomar, State Supervisor, School Library Services, Department of Public Instruction, Raleigh, North Carolina; $120 per print.

School Master* 500 Filmstrip and 2 x 2 Slide Projector shown with exclusive Accessory Rewind Take-up and Semi-Automatic Slide Changer.

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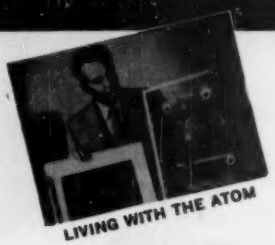
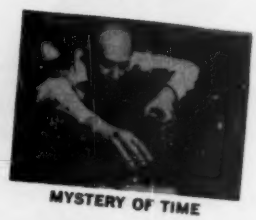


LIVING WITH THE ATOM



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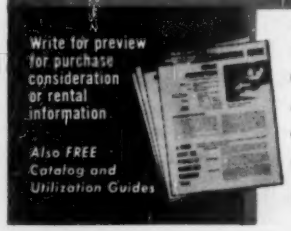

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FEEDBACK

Dear Editor: Regarding Feedback on page 74 of the February issue of AVI: There may not be a controversy but there is ample cause for one the moment someone starts pushing for AV-library amalgamation.

It is granted that the instructional resources concept appears reasonable and practicable. In fact it is practical in *some* states, *some* school systems, and *some* institutions of higher learning.

But the library and audiovisual departments of the colleges and universities are not likely to combine soon. Where will the "instructional resources specialist" get his training? If the training were acquired, where are the jobs? Large school systems can perhaps afford the hierarchy of directors, supervisors and coordinators that are necessary to implement an effective instructional materials program. Not so the small school systems that are in the majority in the country now and will long so remain.

I submit that if the small systems did have an IR specialist, he would in many instances be a frustrated individual because of inability to do an adequate job. Librarians and audiovisualists each wear enough hats without either wanting the other's!

At the building level the IR concept may be practical—if a man is in charge and has plenty of help, including a trained librarian. However, since librarians at the "point of sale" are almost all women, this is not practical. Men librarians are rare in public schools.

Time Not Ripe for IR

Furthermore, in the thousands of elementary schools with neither trained librarians nor trained audiovisualists, a division of responsibility appears to be the only practical answer. It may be that in 15 to 25 years many school systems will be large enough to implement effectively the IR concept. Nevertheless, it seems to me that the tasks of the librarian and the audiovisualist are already large and getting larger all the time. I believe there is need for both specialties in the realm of communications. I expect separate specialization to continue.

Finally, who in public schools is going to be responsible for electronic classrooms, educational television equipment, language laboratories, and teaching machines? Not librarians, I am sure, because they are not and will not be equipped for the job. My guess

is that the AV specialist, because of his training and experience, will inherit these added responsibilities. I trust that he will have help.

—WILLIAM F. DANIELS
CROWN POINT, INDIANA

The Other Side of the Coin

Dear Editor: After reading Mr. Schutte's letter in the February issue of AUDIO-VISUAL INSTRUCTION, I must take pen in hand and write one of my infrequent letters to an editor. As a librarian in charge of audiovisual services in a junior college I was highly amused by Mr. Schutte's apprehensions. For years librarians have been alerted to the danger that their services are about to be "sold down the river" to AV. Now, what a refreshing note that "at a number of audiovisual meetings recently, growing concern has been voiced for maintaining audiovisual services unhindered by complicating and unrelated affiliations with the library."

Mr. Schutte stresses how different library and audiovisual activities are and seems to be thinking mainly in terms of equipment. He forgets the similarity of books, filmstrips, films, records, tapes and microfilm materials. The acquisition, cataloging, maintenance and circulation of these materials is indeed very similar to that used for books. The new Standards for Junior College Libraries (a division of the American Library Association), makes this statement: "Whether or not these [audiovisual] materials are housed in the building and controlled by the library staff, they should be properly indexed in the library catalogs where faculty and students can readily locate them."

I agree with Mr. Schutte "that both AV and library personnel are now sufficiently busy." However, I do not feel that by working together in the materials center (or the library or audiovisual department—whichever you wish to call it) they are complicating matters. Many of us are not fortunate enough to have a budget which permits both library and AV specialists; hence the librarian has widened his horizon and willingly (sometimes unwillingly albeit) accepted the responsibility of providing the new and exciting AV media as well as the traditional library materials.

In closing, I firmly believe the materials center is here to stay and that whether it is administered by a librarian or an AV person, it will best serve its function if there is less fragmenta-

(See the next page)

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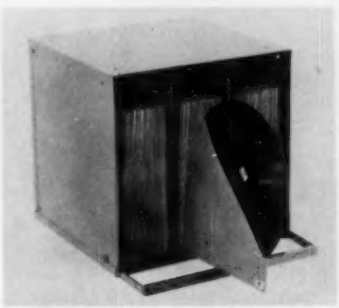

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Pamphlet and Manual

Editor-Educator Seminar, a 35-page pamphlet published by the Joint Committee of the NEA-MPA (National Education Association and the Magazine Publishers Association), features "magazines in the classroom" as a result of their conference held in New York on May 3, 1960. Available from NEA, 1201 16th St., N.W., Washington 6, D. C.: single copies, free; 2 to 9 copies, 25 cents each; discount on quantity orders.

HRS Manual for Teachers and Parents (edited by Frederick D. Eddy) was written to be used with the HRS Junior Language Courses (on LP discs) in French, German, Hebrew, Italian, Russian, and Spanish. Each course is a series of authentic foreign language dialogues designed to give school children (between ages 6 and 12) their first contact with a spoken foreign language. 61 p., $2; quantity discounts; available from Ottenheimer Publishers, 4805 Nelson Avenue, Baltimore 15.

tion and more cooperation among the persons working toward a common purpose: improving instruction.

—GEORGE C. ELSER

CHAFFEY COLLEGE,
ALTA LOMA, CALIFORNIA

Empathy in Films

Dear Editor: The article *Film* by Francis W. Noel in the January number calls attention to a very important point. "How," writes he, "do they [films] contribute to skills in problem-solving (a goal of science)."

For pupils in the first six grades, as Einstein, Mme. Curie and many others emphasize, there should be opportunity for the child to have "the joy of discovery." When the narrator tells, tells, tells, or when the script is so written that the children in the film do not include the children in the classroom among the learners, the film takes out the job of discovery and opportunity for problem-solving. Some filmstrips now give opportunity for pupil participation.

I think also that the teachers guide should emphasize that wherever possible the pupil should be given a *first-hand* experience before seeing the film (as planting seeds and watching them grow). The appreciation will be far greater.

There are some films that are good (Coronet's *Your Friend the Doctor* comes to mind). But so many could be greatly improved. Empathy on the part of the narrator is so important.

—EMMA HUNT

STATE COLLEGE,
FRAMINGHAM, MASSACHUSETTS

Long Road to Asnières

Dear Editor: I have read and greatly appreciated your editorial and the article of Murray G. Phillips in the December issue. . . . I notice in Clips that a Frenchman has got in touch with DAVI so as "to learn everything possible about teaching machines." Thanks to you we have information of this kind along with the address of the French industrialist, with whom I shall try to get in touch. The road from Paris to Asnières (about 10 miles) passes through Washington!

—ANDRÉ LESTAGE

UNESCO, PARIS

Coonskin Caps And Curriculum Change

by Lewis Saks

THE PAIRING in the title above tells something about the unique nature of the Gull Lake Workshop of the Michigan Audio-Visual Association.

Meeting in the rustic setting of Michigan State University's Kellogg conference center on the shores of ice covered Gull Lake near Battle Creek, 57 members of MAVA spent January 27 and 28 bringing themselves up to date on the teaching materials movement in the state. Such questions as the target date for the second NDEA disbursement, the latest word on MPATI (Airborne Television), the forthcoming state conference in Mt. Pleasant, and the national DAVI conclave in Miami Beach occupied the time and efforts of hard working MAVAites. (It is worth noting that MAVA pays almost half of the food and lodging costs of each of the attending members.)

The Okoboji-like Gull Lake MAVA workshop serves as an annual opportunity to spend two program-filled days in work amidst a country setting that is conducive to a friendly camaraderie as well as the planning of projects and reports and the pushing ahead of committee assignments for the coming months.

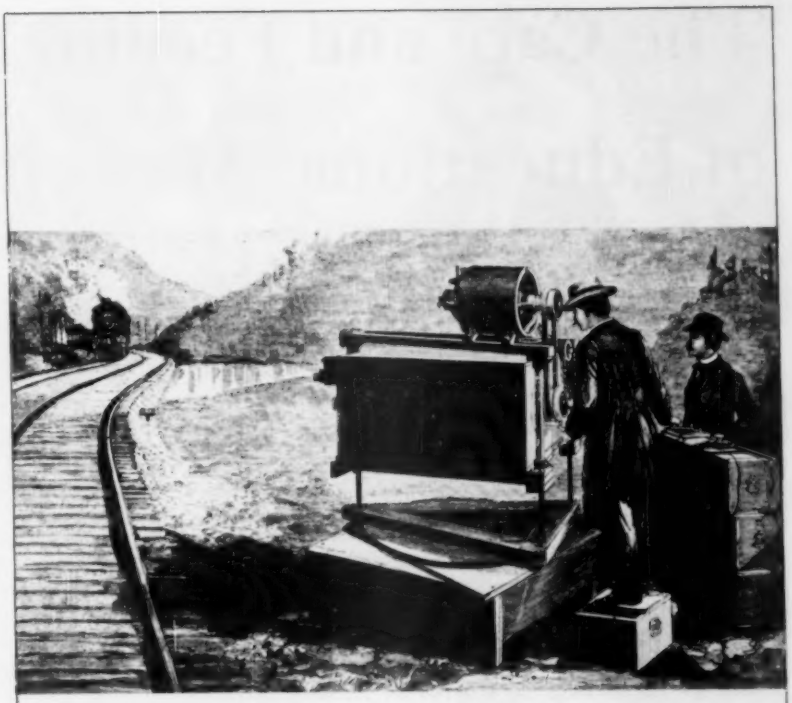
Arriving on Friday noon, kicking off galoshes and claiming a room in the dormitory, MAVA members joined their particular committees in a review of past work, revising publication drafts, and preparing for Saturday's wind-up report to the group as a whole.

Helge Hansen, audiovisual director of Dearborn Schools and president of the Michigan Audio-Visual Association, and attired in a Paul Bunyan sweater, shepherded workshop members through sessions that gave an incisive view of the state of teaching aids in Michigan schools and the role of the professional audiovisual family in serving Michigan's 25,000 teachers.

Glen Heavenrich, Garden City Schools, conference chairman, kept the schedule on schedule, always careful not to tamper too vigorously with the impromptu gathering of workshop members as they exchanged news and views of their localities over a cookie and tangerine. If you moved upon any one cluster of MAVA members at the Kellogg center you might find Ford Lemler of the University of Michigan entertaining film acquisition recommendations from his many client school systems throughout the state. Or Charles Schuller, another senior statesman, in formal session or friendly confab, bringing the group the latest on legislation pointing toward better AV, better schools and a better Michigan.

School people and commercial people, specialists and invited guests, all mingled and reviewed and accomplished the grass roots work that makes Michigan a hard working state for better and richer teaching. Typically, Mrs. Ruth Terry of Muskegon Schools and her cherished project of tapes around the world and Bob McDonell, Jam Handy Organization school department editor, were full of new ideas and shared them with all comers.

The audiovisual media are a force in education and their vitality is apparent at Gull Lake where Michigan people do an exceptional job of meeting together and making friends in the process.



"Cut! Cut!" Mr. Churchill shouted in hoarse excitement to his co-worker, Mr. Wexler. "Now let us reposition the camera hurriedly to 'shoot' a dramatic and revealing close-up for which our Churchill-Wexler films are so justly acclaimed."

Lew Saks is audiovisual director for the East Detroit public schools.

The Care and Feeding of Educational Minorities

EDITORIAL | Anna L. Hyer

EVEN AMONG EDUCATORS our concern with sub-groups and sub-problems is more academic than real. We point with pride at our constitutional guarantees of the rights of minorities. We complain that commercial broadcasters cater only to mass tastes, ignoring the interests of minority audiences. We verbalize about individual differences, many types of learning goals, and the need of variety in teaching methods and materials—and yet what I hear says to me that the only good ideas about media use and organization are those that successfully do everything for everybody.

"Television can only present facts."

"Films are a mass media; they can never meet the needs of individual students."

"The instructional materials idea will never work in my school system."

"If students are tied to teaching machines all day, what happens to social learning, their ability to plan and evaluate, etc.?"

"This may work for the academically talented, but I'd like to see you try it in my class!"

Talk as we will about adapting methods and materials to diversified goals and to individual differences, our words betray a different picture in our minds. This picture is not one of purposeful diversity, but rather of structured totality—all children all day with teaching machines, total teaching of classes by television, filmed teacher demonstrations versus student demonstrations, TV versus films, and many other "either-ors."

Some readers will assume because of our theme this month that educators are being urged to rush into the field of programmed learning. On the contrary, tempered enthusiasm is advocated. At this time the purchase of programs for whole school systems would not be recommended even if the programs were available. This does not mean, however, that educators should stand idly by until all the problems are ironed out. Now is the time to begin pilot projects and to initiate field research and evaluation. While programmers are researching problems related to cueing, branching, step size, fading, and the like, educators should be investigating such questions as: What learning outcomes can be programmed? To what extent will information learned through programs be transferred to new situations and problems? For what kinds and ages of pupils is programming successful? How does the role of the teacher change with the use of programmed instruction? What happens to student motivation and retention? What administrative problems are created?

Many startling innovations in educational methodology are being bandied about in addition to programmed learning. Some of these rather shocking developments may turn out to be highly effective with at least some of our students. A few examples will suffice as illustrations.

Reading Dynamics, a privately operated corporation in Washington, D.C., is claiming reading speeds of 50 pages per minute for their students and supporting these claims by public demonstrations. Even if schools using their methods could achieve only a third of this success and with only a tenth of the school population —would this not be worth our attention? More interest is abroad than you might think in sleep learning and subliminal methods. If it were discovered that five percent of our students could learn facts by one of these methods, could not this too be an important achievement?

In *Saturday Review* a year or two ago I read that researchers had learned that intelligent listeners can understand words spoken at about twice the normal rate of speech—a rate faster than we can enunciate sounds. This same article said tape recorders are available that can compress speech to this degree without distorting it. Think what a boon it would be to students enrolled in lecture courses or in aural language learning if they could be taught speed listening as well as speed reading! Wouldn't it be a significant breakthrough if half our students could double their listening speed, especially if some of these happened to be slow readers? Likewise wouldn't it be significant if programmed learning and television could make notable contributions to the achievement of a quarter of our educational goals with half our children?

If we will break away from our "either-or," "all or none" points of view, we can—to borrow a phrase from Roy Hall—apply "insightful curiosity" to nurture our educational minorities.

"Our Audio-Visual program took wing once we found the key to teacher enthusiasm."

Says
Thomas W. Conner,

Director of Audio-Visual Aids for Ridgefield, New Jersey, school system at Ridgefield High School selected by the American Association of School Administrators for its exhibit of outstanding school designs:

"As teachers, we're not necessarily mechanical wizards when it comes to operating movie projectors.

"But once we found a projector a teacher can operate, one that would not interrupt its own performance by some teacher-baffling mechanical problem, we became truly enthusiastic and our A-V program took wings.

"Now our teachers enthusiastically audition, preview, and cull, to find those films which are to their and to their students' best advantage. Perhaps the key to this was letting our teachers select the projector themselves–the Kodak Pageant Sound Projector, it turned out.

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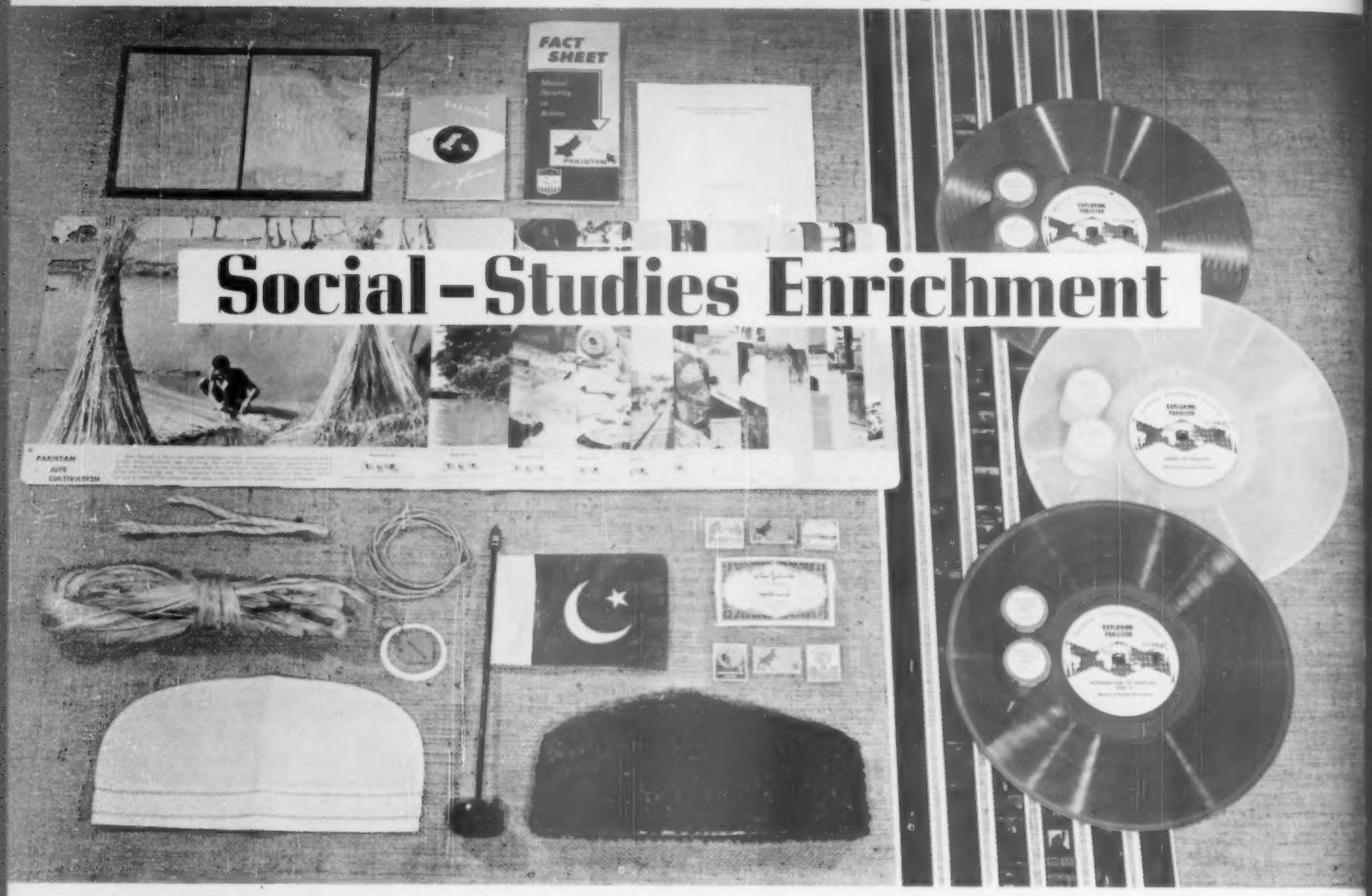

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